

Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

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GENERAL NEWS SECTION

SUPPLY TRADE SECTION

Some time ago we announced that the excavation work on the Transandine tunnel, connecting the railway system of the west coast of South America with the railway system of the east coast, was finished. We find that this announcement was premature. According to a report just received, the tunnel headings met on Nov. 27. It is expected now that the tunnel will be opened in March, 1910, connecting Valparaiso and Santiago in Chile with Buenos Aires, Argentina.

The National Apple Show, held at Spokane, November 15-20, like every useful enterprise undertaken by the smart people of that region, was carried through with much éclat, and the success and attendance were decidedly ahead of last year. They never do things by halves out that way, and some of the most interesting prizes went not for single apples, or for plates, or even for sample boxes, but only for carloads. The prize for the best packed carload went to O. A. Smith, of Garfield, Wash., who sent a display of "Rome Beauties." The largest single apple in the show was a "Spokane Beauty," weighing 41 oz. and measuring 17½ in. around the middle. It was entered by F. L. Post & Sons, of Chelan, Wash. The second largest was a Wolf River apple, entered by B. K. Short. This weighed 37 oz. The show occupied a tent covering three acres, and it was opened by President Taft, who pressed a gold button at Washington, November 15. About

1,500,000 apples were exhibited by 400 exhibitors. The railroads were prominent in the enterprise, and Howard Elliott, president of the Northern Pacific, was president of the exhibition and gave out the prizes. Each afternoon a lecturer of the Southern Pacific gave a stereopticon exhibition, showing the beauties of California. James J. Hill, president of the Great Northern, ordered 100 boxes of apples at \$10 a box to be sent to stockholders of the Great Northern in Europe and to other friends, such as King Edward of Great Britain, the Queen of Denmark, and German noblemen. The kind of apples receiving the most general and warmest commendation at the show was the Spitzenerberg.

According to a press despatch, the state railway commission of Pennsylvania has dismissed a complaint presented by the people of Ben Avon, alleging excessive whistling by the locomotives of the Pittsburgh & Lake Erie, on the ground that the commission has no authority to deal with such complaints. If that is the effect of the laws of Pennsylvania it is highly desirable that those laws be changed. Whistling is a constant nuisance in a great many places, yet one that is often hard to define accurately, and still harder to suppress. The nuisance ranges all the way from outrageous imposition on people with strong nerves, through the various gradations that disturb sensitive people in different degrees to those cases where the noise seems almost necessary, notwithstanding the annoyance that it produces. Beyond this are the cases of remote country districts where people are so lonely and trains are so few that the engineman who enjoys shrieking is welcomed as a friend. His disturbance of the otherwise depressing conditions is looked upon as salutary. Such an elusive subject is hard to deal with by the hard and fast treatment of a statute, while on the other hand the most useful function of a state railway commission is to attend to matters of that kind. The legislature cannot regulate whistling because the trouble is too indefinite; and the courts cannot profitably redress grievances because the damage to the aggrieved is also indefinite: hard to measure. The cure consists in publicity and persuasion on the part of the public officer (the railway commissioner) and in premiums and punishment by the railway superintendent. Persuasion is needed, instead of mandatory statutes, because the railway officer, being responsible for results, must have a good deal of liberty. The persuasive processes must be pretty freely made public, so as to prevent delay on the part of superintendents who are inclined to use their liberty so freely as to encourage lax practice. Premiums for enginemen are peculiarly appropriate in a matter like this because so much must depend on the engineman's judgment and discretion. The use of a comparatively small sum of money for premiums, to be based on freedom from noise and from well-founded complaints of insufficient whistling, would produce a beneficial agitation of the subject, in spite of the difficulty of adjusting the amounts of premiums closely to the different merits of different men. Punishment is an essential factor, because some runners cannot be cured of their carelessness by premiums alone.

The paper on the "Electrification of Chicago Railways," which was published November 26, is the best statement of the case from the railway standpoint that has been made. The discouraging part of it is the implication that even if the railways were ready and willing to electrify they would not be able to do it successfully on account of the uncertainties in the present state of the art. While the author admitted that electric locomotives can be made powerful enough to handle heavy trains at slow speeds about terminals he thought there would be difficulties in the heating of the armature which would prevent successful long distance operation equivalent to the present through express service as operated by steam locomotives. The operating results of the

Great Northern electric locomotives at the Cascade tunnel show that much progress has been made in designing electric locomotives for heavy loads in sustained service, and that the temperature difficulties have been largely overcome. These locomotives were designed to handle trains weighing 2,000 tons over the mountain division, a distance of 57 miles. The specification required them to develop 1,000 h.p. continuously for three hours with a temperature rise of 75 deg. F. The actual tests, as recently reported by Dr. Cary T. Hutchinson, in a paper before the American Institute of Electrical Engineers, show a continuous output of 1,500 h.p. at 500 volts and an hour rating of 1,900 h.p. without exceeding the temperature limits. Electric locomotive design has advanced to that stage where it is possible for the builders to guarantee a sustained horsepower equal to 75 or 80 per cent. of that developed under slow work like that of terminal operation. The specifications for the new Pennsylvania locomotives for the New York tunnel require them to start a train of 550 tons up a 2 per cent. grade, and the guaranteed tractive effort is 60,000 lbs. The normal speed upon a level track is 60 miles an hour. At maximum capacity the locomotive develops 4,000 h.p., and for sustained heavy output the motors are designed for forced ventilation, though the ordinary tunnel operations will not require this provision. These two examples show that electric locomotives have been built and are in successful operation which would be sufficient for the ordinary requirements of Chicago electrification. The railways and their advocates have other and better reasons for declining to electrify Chicago terminals at present.

The case of the Hisylvania Coal Co. v. the Toledo & Ohio Central, given in our columns this week, is reported at much greater length than the case itself warrants, because it shows so clearly the attitude of the Ohio railway commission. The questions passed on by the commission are exactly such questions as might be passed on by a civil court. The facts are judged and the law is interpreted by a body of men whose functions, if they are constitutional, are most certainly legislative and not judicial. We print also this week an abstract of a case decided by the New York Public Service Commission, Second District, in which the commission plainly states that it cannot usurp the functions of a court, and refuses to make reparation for an alleged overcharge, because, it says, if the overcharge was actually of such a nature as to demand reparation, the commission would recommend that the railway company pay the claim, and it would rest with a court to enforce this recommendation. The opinion of the commission is particularly interesting because of the great number of cases that have been brought before the Interstate Commerce Commission asking for a refund on rates which, since the shipment in question, had been declared excessive by the commission and had been reduced by the railways. In a great number of these cases the Interstate Commerce Commission has ordered the refund to be made, but in general this was because the railway company acknowledged the fairness of the shipper's demands. As Commissioner Decker, of New York, emphasizes in his full opinion, of which we have reprinted but an abstract, the possibilities of real discrimination and rebating, through temporarily keeping a rate disproportionately high, then reducing it and making refunds for the excessive overcharge, are very abundant. This the Interstate Commerce Commission would probably agree to, but that body has never, to our knowledge, made the clear distinction between a legislative and a judicial function that is made in Commissioner Decker's opinion.

THE RAILWAY LABOR SITUATION.

The newspapers for several days have been giving prominence to sensational reports that a general strike of railway employees is imminent. There is no foundation for these

reports. The only strike thus far declared is that of the switchmen in the Northwest, which was referred to in our issue of December 3, page 1095. Other employees besides the switchmen have asked for raises in wages and the officers of the railway brotherhoods are quoted as saying that it is intended to use every proper means to secure them. That the officers of the railways are unwilling to make increases on the eve of merely *prospective* prosperity does not necessarily create a threatening situation. A situation similar in some respects existed three years ago. Employees then made demands for advances in wages, all of which the officers could not concede, and then, as now, sensational reports were printed broadcast that a strike was almost sure to result. But after the employers and employees failed by conference to adjust their differences Chairman Knapp of the Interstate Commerce Commission and Mr. Neill, United States Commissioner of Labor, were invited to use their good offices as mediators under the Erdman act. A satisfactory adjustment of the matters in controversy resulted; and no labor troubles ensued.

There are, however, some important differences between the situation then and now. Then the railways were on the crest of the greatest prosperity that they ever enjoyed. Now they are just emerging from a period of depression in which many of them were brought to the verge of bankruptcy, and some were precipitated over it. Now, also, the wages of employees are substantially higher than they were then; for, unlike other classes of labor, they did not suffer reductions in the hard times. One of the main arguments used for an advance in wages is that the cost of living has materially increased. It is true that the cost of living has materially increased during the past ten years, but it has not materially increased since the last general raise of wages was made. Another argument advanced is that wages should be raised because the earnings of the railways recently have largely increased. But these increases in earnings have barely put the railways back where they were before the panic.

In view of these facts, the officers of the railways may be expected to "go slowly" in considering another general increase in wages. But those who say that there either will be such an increase or a strike overlook the character of railway employees, of the organizations which they compose and of the men at the head of those organizations. The Switchmen's Union of North America is a comparatively small organization which has not had the benefit of such high class leadership as the Brotherhood of Railway Engineers, the Order of Railway Conductors, the Brotherhood of Railroad Trainmen, etc. The leaders and members of the latter organizations are among the most intelligent of American workingmen. There is no serious danger, therefore, that there will be strikes by these organizations before full and amicable conferences on all questions at issue between them and their employers. Should there be failure to get a settlement by conference past experience indicates that the differences would be mediated under the Erdman act. The officers of the railways and those of the older and stronger railway brotherhoods recognize the fact that the public as well as railways and their employees has rights that should be respected, and that they will come to a final breach which would paralyze commerce is extremely improbable.

The switchmen in the Northwest showed an utter disregard for the rights of the public when they struck. The chairman of the General Managers' Committee of the Railways and the president of the Switchmen's Union on November 23 jointly signed a telegram to Messrs. Knapp and Neill, asking them to use their good offices as mediators under the Erdman act and to be present for this purpose in St. Paul on November 27. While the negotiations were still going on, pending the arrival of Messrs. Knapp and Neill, an order was issued directing the switchmen to strike on November 30 if their full demands had not then been conceded. This was a flag-

rant violation of the understanding with the railway managers. It made mediation a practical impossibility. In consequence, Messrs. Knapp and Neill demanded that the controversy be submitted to arbitration under the Erdman act. The railway managers consented to this and agreed to abide by the decision of the arbitrators, but the switchmen refused to accede to it. The mayor of St. Paul has been acting as counsel for the switchmen, and as such has publicly taken the switchmen's side in the controversy; but the facts show so plainly that they are entirely responsible for the ruction and the consequent demoralization of business in the Northwest that enlightened public opinion can hardly fail to side with the railways. The record of the railways' conference committee shows that it may be relied on to always insist, in common with the better class of leaders of organized labor, that consideration be given the public and its interests, and that, in the event of a failure to agree on a settlement in conference, the matters in controversy shall be submitted to arbitration.

THE FUTURE OF ELECTRIC RAILWAYS.

Returns for the year 1909 showing decidedly increased prosperity of the Massachusetts street railways signify a published fact which may be supplemented by a fact which has not been published. The unpublished fact is that the 1,300 miles, more or less, of street railways held by the New York, New Haven & Hartford in the three states, Massachusetts, Rhode Island and Connecticut, at the end of the present year will prove to have "washed" the steam corporation's investment in them which, if rental payments be capitalized, can hardly be less than \$80,000,000. Of this great sum probably not less than one-half, or \$40,000,000, represents original water which, in the purchases for control, the steam corporation has had to solidify and buy at the price of real property. Yet increased traffic has filled the gap. In the main the acquired lines are in populous territory and in or between cities, some of them of considerable size. But not a few of the lines are of the "cross-country" order depending upon rural or semi-rural traffic. Recreative and shore traffic in the summer is also a considerable factor; and, taken as a group, the system of 1,300 miles is heterogeneous enough to typify almost every form of street railway problems and give the general problem its forecasts.

In the few years of history during which this great system of trolley roads has been in the welding one fact has been conspicuous and striking. Although much of the prosperity of the system has been dependent on factory centers that were seriously affected by the industrial depression business held up far better than on the steam lines. Here and there locally, especially in Rhode Island, traffic was hit hard. But on the system as a whole it positively increased. What conservative directors, at the time the street railway purchases were made, feared would be a calamitous overload has proved to be ballast in the storm of a panic year and later will presumptively be a profitable cargo.

But with such an impressive example before the eye as this bold New England venture into street railways it is the future of the electric roads of the country that rouses the greater interest. One can predict at the outset that, in new electric railway enterprise, no such aquatic quality on a big scale is likely to repeat elsewhere the southern New England case of overcapitalization. Old electric lines, originally watered, will doubtless be consolidated and brought in, water and all. But in the case of new lines except, may be, in frontier or very thinly settled regions of the country where "getting the trolley" is the main thing the era of extensive stock watering is nearly over and, in many regions, entirely done. This follows not merely from the decrease of profitable territory but from the attitude of the public whether representing investors or the everyday traveler. The investor is bound to scrutinize more closely the fiscal conditions of new

electric railway projects and look with deeper suspicion on the promoter. As for the general public it is represented now by state commissions almost always having greater or less jurisdiction of electric lines and usually a jurisdiction which, during the last two or three years, has been decidedly increased. Those commissions are far from flawless. They remain still overmuch a refuge for the peace hunter and political weakling. But even on them the outcry against electric railway hydrostatics has not been lost nor the warnings of the past—with the New York City tractions vividly in the limelight.

Under these restrictions pointing to more conservative capitalizing than heretofore it is probable that revived prosperity will bring with it a noteworthy but not excessive renewal of street railway construction. It, like other enterprises, has been held up by the post-panic period of nearly two years with its investment timidities and the reversed result should logically follow the return of confidence. Consolidation is also pretty sure to go on apace and with that consolidation—saying nothing of new long distance construction—a tendency toward increased local rivalry with steam lines, modified, however, by the growing values of the trolleys as lateral feeders. On a much diminished scale it seems also probable that the acute steam-trolley questions of a few years ago will seek their replies, but under changed conditions, one being the progressive substitution of electricity for steam on the old steam road itself, beginning with the large city terminals, extending to suburban business and later attacking the problem of electric operation of main lines—the problem in which, as it happens, the New Haven is a pioneer. And beyond, though still a far-away cry, is the problem of closer interchange of traffic between the electrified steam line and its subsidiaries. In the future development of electricity on the old steam line must again not be forgotten the public attitude and demand for the cleanly operation by current in place of the uncleanly operation by coal with its vexing trail of smoke and cinder. One successful application of electricity to large main line traffic may be epoch-making.

Once or twice in past years we have referred briefly to the difference in degree of the relations to the public of the steam road and the street railway. Both fall into the category of public utilities with their responsibilities in matters of public convenience and necessity. But of the two the public contacts of the street railway are the more continuous and close. It is expressed by the case of the street railway passenger who often takes his car three or four times a day and the steam passenger whose trip is apt to be occasional. In the future with the closer combination of the street railway with the present steam line to what extent will the latter assume this intensified public relation and with what result? The answer to that query opens a deep vista of conjecture with a louder cry for public ownership as one of its possible ultimates and with the street railway as its first objective. The theorem is still cloudy, its demonstration uncertain and very remote. But while the refluent wave of prosperity—especially if it is a long wave—is sweeping over the nation the flotsam and jetsam in its wake will bear study.

DISSOLUTION OF THE ROCK ISLAND-FRISCO COMBINATION.

The Rock Island-Frisco combination no longer vexes the trust-busting fraternity. Mr. Yoakum and his associates have received back the securities which they put into it, and with them control of the St. Louis & San Francisco, the Chicago & Eastern Illinois and subsidiary lines, and these railways will hereafter be operated independently, although on terms of close amity with the Hawley roads. The Moore brothers, D. G. Reid and their associates have got back control of the Chicago, Rock Island & Pacific, and it is reported that they have got control of the Lehigh Valley and are seeking possession of the Wabash.

The dissolution of the Rock Island-Frisco combination,

which is the most dramatic event in the railway world thus far in 1909, is due to a number of causes. A statement issued by those who controlled it indicates that it was dissolved largely because of threatened legal action by the national and state governments. But this seems more diplomatic than illuminating. It appears better adapted to conciliate the "powers that be" than to explain what has happened. Anti-trust laws did not prevent the combination, and probably they had precious little to do with its termination. It did not secure the results expected from it, and the men who effected it found, or believed they found, that their business interests, instead of being harmonious and tending to become identical, were divergent and in some instances even antagonistic. That the common control did not produce the results expected was owing to a number of reasons. The Rock Island lines and the Frisco are not, speaking broadly, natural connections, and therefore did not serve to any material extent as feeders to each other. The main way, therefore, that joint control could be made profitable was by the economics of operation which it rendered possible. But the organization necessary for this was never worked out except in the traffic department. Mr. Biddle was vice-president in charge of traffic in all lines, and joint traffic agencies were established throughout the country; but the operating department continued to be entirely separate. There was no operating executive like Mr. Kruttschnitt of the Harriman Lines or like Mr. Schaff of the New York Central Lines west of Buffalo who co-ordinated, supervised and stimulated improvements in methods in the operation of all lines. The Committee on Standardization appointed some months ago had not had time to accomplish much. The roads, in short, never were welded into a true "system," a thing that is essential to making any combination of railways of benefit to its owners or the public. Furthermore, the aims and ambitions of the several men in control were not compatible. Mr. Yoakum was not content to be merely one member and the principal executive officer of a combination of railways, even though a large one. He had independent ambitions which he gratified by building the St. Louis, Brownsville & Mexico, by getting interests in other properties, and finally by associating himself with the Hawley group in buying the Missouri, Kansas & Texas. The Messrs. Moore and Mr. Reid evidently thought, perhaps not unnaturally, that he could not give his best abilities and energies to the Rock Island-Frisco Lines while having a large interest in a competing property.

The dissolution of the Rock Island-Frisco combination—it never was a real "merger"—invites comparison between it and another great railway combination in the West, that of the Harriman Lines, which shows no sign of falling to pieces. One respect in which, until very recently, the Harriman combination differed from the Rock Island-Frisco combination was that, although a number of men had large holdings in it, it was absolutely dominated by the personality and genius of one man. Instead of being held together by a rather flimsy holding company, it was and is united financially by the Union Pacific owning directly or indirectly a majority of the stock of the other roads. While preserving the autonomy of each road, and to some extent even of each division, the splendid organization of the Harriman Lines, supplementing their financial relations, actually welds them into what may properly be called a "system." Finally, and perhaps most important of all, the Union Pacific from Omaha to Ogden, and the Southern Pacific from Ogden to San Francisco, are natural connections, while, as has been remarked, the Rock Island and the Frisco are not in any such sense natural connections. The fulfilment of the Union Pacific's destiny imperatively demanded that it should acquire the old Central Pacific line; and since it could not get this without acquiring control of the entire Southern Pacific system, it took the entire system; and it may confidently be predicted that the merger of the Union Pacific-Southern Pacific lines will never actually be dissolved, either voluntarily, as in the case of the Rock Island-Frisco

lines, or by legal proceedings, while the Central Pacific remains a part of the Southern Pacific.

The disruption of the Rock Island-Frisco lines contains important lessons in railway economics and public policy. The combination probably was in violation of the Sherman anti-trust law and of various state anti-trust laws from its inception. The roads composing it were, for example, the principal competing lines between Memphis and Oklahoma City. They were natural competitors for business between Chicago and the entire southwest. They were natural competitors between Kansas City and Oklahoma City. In fact, one can trace on the map many more points where they were competitors than where they were feeders of each other. But the management, advised by some of the very ablest railway counsel in the country, proceeded so diplomatically that it avoided serious attacks upon the various anti-trust laws. But while the anti-trust laws—which, as construed by the courts, American business could not obey without to a large extent ceasing to exist—did not prevent or destroy the combination; the diverging personal interests of the men who formed it and its failure to serve the purposes which were expected of it finally disrupted it. The result illustrates the fact that the operation of natural forces affords much more effective protection to the public against the evils, real or imaginary, of industrial combination than legislative enactments, however drastic. We believe it might be stated almost as a truism that any railway combination which serves a permanently useful purpose to those who form it will, in the long run, be beneficial to the public, and that any combination which in the long run does not serve a useful purpose to its promoters cannot long exist. The fact is not widely enough recognized that the personal element largely influences the effectiveness and stability of industrial combinations. The successful organization and management of a large combination such as the Harriman lines or the Rock Island-Frisco lines require a dominant personality and a capacity for organization which are not found united in a single man once in a century. Before Mr. Harriman died it was popularly said that he was master of 50,000 miles of railway. The newspapers were full of expressions of fear as to the results of centralizing the control of so many transportation lines in the hands of one man. But the danger, if danger there were, was terminated with Mr. Harriman's death. He dominated so many railways, not through stock ownership but through genius, and his genius was personal to himself; and when he died the lines controlled by the Harriman group of financiers shrunk at once to only those controlled by them through actual stock ownership, which is a very small part of the total mileage in which Mr. Harriman was the dominant factor. The results following Mr. Harriman's death and the dissolution of the Rock Island-Frisco lines show that if the public would leave more to be accomplished by the operation of natural laws, and would rely less on fussy legislative enactments, its true interests would be as well or better protected than they are now, and the injury to government and to business from unwise legislation would be much less.

NEW BOOKS.

Pere Marquette Monthly Magazine. Paul Leake, Editor, Union Depot, Detroit.

This is a new publication devoted to the interests of the employees of the Pere Marquette Railway. The first number contains about 60 pages, and is made up of miscellaneous matter, which it is hoped that the employees will take home to their families, together with information about the stations and the agencies of the road.

Railroad Structures and Estimates. By J. W. Orrock, C. E. John Wiley & Sons, New York; Chapman & Hall, Ltd., London. 270 pages, 94 illustrations and diagrams; cloth, Price, \$3.00.

The author states the object of the book is to cover in brief and concise form the numerous subjects that enter into the

engineer's estimates of railway building for the purpose of ready reference as to general construction and cost on a business rather than a technical basis. The scope of the book is shown by chapters as follows: I, Track Material; II, Fences, Gates, Sign Posts, Road Crossings and Guards; III, Culverts; IV, Bridges; V, Buildings; VI, Water Stations; VII, Shops; VIII, Specifications and Contracts; and IX, Estimating Notes. The illustrations are mostly the Canadian Pacific Railway Standards. Throughout the text are 56 useful and convenient tables. It is well indexed and conforms to the excellent standard of Wiley's engineering publications.

The subject is one regarding which there is little published matter in book form. Immediate comparison is suggested with "Buildings and Structures of American Railroads," by the late Walter G. Berg, Chief Engineer of the Lehigh Valley. The latter gives excellent general description and profuse general illustration of all kinds of railways buildings and water tanks, snow sheds and ash pits with occasional information as to general cost. Mr. Orrock does not cover buildings proper nearly so elaborately, generally neither illustrating or describing more than one of a type, and making little attempt to show the varying practice of different railways. On the other hand, he includes a discussion of track materials, culverts and bridges, and the illustrations show many details of construction and dimensions. In all cases he states the cost and notably leaves space for annotations as to actual costs. As costs must necessarily vary at different places and from time to time, the statements and tables of costs are more valuable as they suggest methods of estimating than as an exact source of information. Even so he is not clear. For example, deck plate girder bridges are shown as costing 5 cents per lb., presumably erected. Within a year such work has cost less than 2 cents at the shop and less than 2½ cents erected. He uses the same price to cover all classes of shop work and makes no distinction for draw-bridge machinery, whereas there are wide differences. Some portions of the book go well into details; others are perfunctory and state too wide limits. Tunnels, which are given 2½ pages, might well have been left to a volume of twice the size of this book. Bridges, and perhaps culverts, could also have well been left to books dealing solely with such subjects. The same might be said of specifications and contracts so far as they are general. While the book is too diffuse in scope for its limited size, in many matters not exact enough to be satisfactory and in others misleading, unless the reader already has considerable knowledge of the subject, such criticism is perhaps more because of the difficulty of the subject and the lack of literature thereon than carelessness or inability on the part of the author. As a first edition it is a step toward the compilation of much needed information to engineers and railway men. There is much of value and suggestion of much more which it is to be hoped may be added to future editions. Could the author obtain data and criticism from those who need and will use such a book, and use them judiciously, future editions will be among the most valuable sources of information regarding the practical side of railway construction.

Letters to the Editor.

HOW TO BE A FIRST CLASS CHIEF CLERK.

Mobile, Ala., December 3, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

I have read with such great interest the article in your issue of November 19, page 973, by F. T. Dickerson, on the subject of "How to Be a First Class Chief Clerk," that I wish every man holding the position of chief clerk in the general or division office of a railway might read it.

Any person true to himself and given to introspection of

his qualifications for the position he holds in the business world, cannot help but know his vulnerable points, and, knowing, strive to overcome them. Mr. Dickerson in his article has so fully elucidated the difficulties incident to a chief clerk's position, his requirements to properly overcome them and his qualifications to efficiently perform his duties, that any one holding such position can read his article and be the judge of his own weaknesses.

My attention was especially attracted to his paragraph on "Courtesy." Lawrence Sterne, the Irish poet and humorist, in his "Sentimental Journey Through France and Italy by Mr. Yorick," says:

"Hail, ye small sweet courtesies of life, for smooth do ye make the road of it!"

And how true it is that small courtesies rendered smooth out rough places, even in business life.

There is often an inclination on the part of the chief clerk in the daily routine, with its interruptions and annoyances, to sometimes be a little abrupt and curt in his speech or actions, but by watchfulness and careful drilling in the small courtesies of life, as Mr. Dickerson says, "a request can be refused and a friend gained." This not only applies to the man himself, but to the interests he represents.

This article by Mr. Dickerson has made such an impression upon me that I cannot too favorably comment on it.

M. J. WISE,
Chief Clerk to General Manager, Mobile & Ohio.

IMPRESSIONS OF THE NEW HAVEN ELECTRIC LOCOMOTIVE.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Some time ago I rode on one of the electric locomotives of the New York, New Haven & Hartford from New York to Stamford and return.

The object of the trip was to observe the riding qualities in the matter of nosing. The engine was of the double truck type with two pairs of drivers in each truck and a single carrying wheel at the ends as in Fig. 1.

The riding of the engine was all that could be desired. The movement was very steady and there was no sign of nosing at any time.

The speed, however, was not very high and my estimate is that it at no time exceeded fifty miles an hour. The cab was

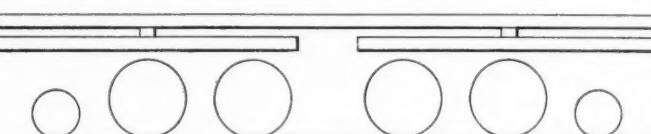


Fig. 1.

very noisy because of the air compressor and ventilating fan and in this respect compared unfavorably with the New York Central d.c. engine as worked on the experimental track at Schenectady.

The impression gained on pulling out of the Grand Central station was that with the d.c. in operation the engine was overloaded. The movement appeared sluggish, and there was the feeling all up the line that the engine was being held back. As soon as the overhead a.c. current was taken on, at Woodlawn, that feeling instantly disappeared and the engine seemed to have a new life forced into it, and it moved ahead and accelerated at a very much more rapid rate, and instead of conveying the feeling of overload seemed to have a load well within its capacity.

On remarking it to the driver he said, that there was as much difference between the a.c. and d.c. as there was between day and night. And yet at the start the acceleration appears to be more rapid with the d.c., but when once under headway, it is the a.c. that makes the livelier engine. The impression

is the same as that conveyed by what are known as lively and logy steam engines.

The engine handles with remarkable smoothness and starts without the faintest suggestion of a jerk.

Talking with the drivers elicited the information that the engines were now doing satisfactory service, though the troubles of the past were more than multitudinous. As for speed, when first put into service there was no apparent limit, and owing to the delays and the desire to make up time exceedingly high speeds were indulged in.

This resulted in excessive nosing, and at times this was so great that a driver could not stay in his seat without bracing himself or holding on. This was when the engine had no carrying wheels but had a wheel-base arranged as in Fig. 2.

The introduction of the extra wheel stopped the nosing;

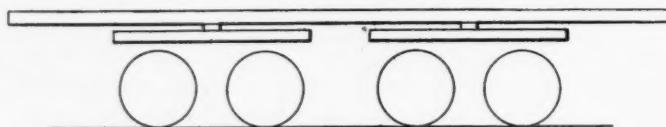


Fig. 2.

but at the same time, a speed limit of fifty miles an hour was placed upon the runners. This was afterwards raised to fifty-five miles and recently it has been made sixty miles. Both drivers with whom I rode agreed that the early electrical troubles were very great.

The means of handling the engine are very conveniently arranged buttons on the controller case, serving to raise or lower the third rail shoes, the overhead contactor, apply sand, etc.

As it stands the engines are popular with the men whereas "at the start they dreaded to see them and never knew whether they would run ten feet or not."

There is no trouble.

In commenting on these impressions an officer of the road writes:

"Of course, the air compressor motor is a machine common to both the New York Central and New Haven type of locomotive, and the excess noise, which you noted in the New Haven locomotive, I think, can be charged entirely to the ventilating fan.

"As a matter of fact, our direct current rating is higher than our alternating current. I have received much the same impression that you describe concerning the overloading effect when the locomotive was operating on direct current, but on account of this rating, of course, the impression is only apparent and not real. There seems to be a larger cushioning effect when alternating current is used as a transfer agent between electrical and mechanical energy, and I believe this accounts for our mutual impression."

ENGINEER.

Contributed Papers.

TRAIN ACCIDENTS IN SEPTEMBER.¹

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of September, 1909. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local

¹ Abbreviations and marks used in Accident List:
rc, Rear collision—bc, Butting collision—xc, other collisions—
b, Broken—d, Defective—unf, Unforeseen obstruction—unx, unexplained—derail, open derailing switch—ms, Misplaced switch—
acc. obst, Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of boiler of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Ft., Freight train (includes empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation:

Collisions.

Date.	Road.	Place.	Kind of Accident.	No. persons reported		
				Train.	Kill'd.	Inj'd.
1.	H. & Brd Top.	Riddsburg.	bc	Ft. & Ft.	3	2
3.	Erie	Attica.	xc	Ft. & Ft.	1	2
7.	Norf. & Westn.	Rural Retreat.	re.	Ft. & Ft.	2	4
8.	Nor. Pacific	Missoula.	be.	P. & Ft.	2	3
9.	S.P., L.A. & S.L.	Tintic Junc.	be.	P. & P.	1	8
†12.	C., B. & Q.	Burnham.	bc.	P. & Ft.	2	9
*15.	N. C. & St. L.	Pegram.	bc.	P. & Ft.	8	18
*21.	Bost. & Maine.	Pattee.	re.	P. & P.	3	0
22.	N. O. & N. W.	Hattlesburg.	bc	P. & Ft.	1	4
24.	Louis. & Nash.	Warrior.	bc.	Ft. & Ft.	1	0
26.	South. Pacific.	Araz, Cal.	bc.	Ft. & Ft.	2	1
*†28.	P.C.C. & St.L.	Chicago.	re.	P. & Ft.	6	10
29.	Balt. & Ohio	Dundas, Ohio.	xc	Ft. & Ft.	1	0

Derailments.

Date.	Road.	Place.	Cause of derilm.	No. persons reported		
				Kind of train.	Kill'd.	Inj'd.
4.	Balt. & Ohio	Chewton, Pa.	malice.	Pass.	2	17
9.	Mo. Pacific	Palmer.	b. rail.	Pass.	0	24
11.	C. M. & St. P.	Bassett.	acc. obst.	Ft.	2	1
14.	C. M. & St. P.	Orient.	b. rail.	Pass.	1	6
18.	Atl. Coast Line	Winston.	unx.	Pass.	1	1
22.	Southern	Montview.	unx.	Pass.	1	0
23.	Ches. & Ohio	Huntington.	unx.	Ft.	1	4
25.	Gr. Rap. & I.	La Otto.	unx.	Ft.	1	0
25.	Southern	Atlanta.	unx.	Ft.	1	0
26.	L. S. & M. S.	Painesville.	derail.	Ft.	0	0

The butting collision between a westbound passenger train and an eastbound freight near Pegram, Tenn., on the 15th, occurred while both trains were running at full speed, making a very bad wreck. The combustible portions of the cars at once took fire and the bodies of some of the victims were burned beyond recognition. Two enginemen, one fireman, one traveling engineer, one brakeman, one express messenger and two mail clerks were killed, and two trainmen and 16 passengers were injured. One passenger car, a mail car and express car, a baggage car and eight freight cars were consumed in the flames. Orders had been issued by the despatcher for these trains to meet at Pegram, but the passenger train had run a mile beyond that station. The order had been delivered to the passenger train at Bellevue, seven miles east of Pegram. The fireman of this train, who was but slightly injured, says that the order was forgotten by the engineman, the traveling engineer and himself, all having read it. The conductor overlooked the meeting point, and had not shown the order to his flagman, as was required by the rule.

The rear collision of passenger trains at Pattee, N. H., on the 21st, was due to neglect of flagging. The conductor and rear brakeman of the leading train failed to realize that they were losing time and did not protect the rear of their train by throwing off fuses. The first train, No. 4, consisted of an engine and five cars. It left White River Junction five minutes ahead of the second train, No. 6, consisting of two engines and nine cars. After leaving White River Junction the engine of No. 4 failed to make steam and lost 12 minutes in 13 miles. The engineer of the first train intended to stop at the south switch at Pattee and take the siding to allow No. 6 to pass, and he whistled for the flagman to go out when about 1,500 ft. north of the switch mentioned. The first train was moving at a speed of about eight miles an hour when the second train ran into it, the flagman having got back but a very short distance. Neither of the engines of No. 6 was badly damaged, but the rear end of rear sleeping car of No. 4 suffered seriously; the smoking room, however, was in the rear end of the car and the passengers escaped injury. The engineman and fireman of the second engine of the second train and a trespasser riding on the baggage car of that train were killed. The collision occurred about 4 a.m. The wreck took fire from the coals in the firebox of the wrecked engine, but the flames were soon extinguished.

The collision in Chicago, on the 28th, occurred at Twelfth and Rockwell streets, about 12:30 a.m., a southbound express train of the P. C. C. & St. L. running into the rear of a preceding stock train of the Chicago, Milwaukee & St. Paul, which was moving very slowly. The caboose and six cars

of the stock train were wrecked, and the victims were drovers riding in this caboose, most of them asleep.

According to the findings of a coroner's jury it appears that on this part of the line, used by the freight trains of several companies and often considerably crowded, only the passenger trains are scheduled; that both passenger and freight are required to run under control, and that as to the fault the testimony was so conflicting that the jurymen could reach no satisfactory conclusion. They recommended the introduction of the block system "as early as track elevation will permit." This means, presumably, automatic signals, for they also recommend that pending the improvement signalmen be stationed to prevent such disasters. In other words, the block system should be introduced at once.

The butting collision of freight trains on the 1st is reported as due to the failure of a station agent to deliver an order to one of the trains, and that on the 12th was due to a mistake in orders. Of the persons killed in the collision on the 8th one was a trespasser, and in the collision on the 26th both of the persons killed are said to have been tramps.

The derailment on the 26th occurred about 2 p.m. It was at the crossing of the Baltimore & Ohio and the newspaper accounts say that the train (No. 24, composed of an engine and express cars) was going at the rate of 45 miles an hour. The engine and three cars went off. The explanation of the engineman's failure to heed the stop signal is that he was dazzled by the bright reflection of the sun from a pool of water.

The newspapers reported in the month of September 28 electric car accidents, of which six or seven resulted in fatal injuries. Three others were butting collisions on interurban lines where cars are run habitually at high speeds. In three other cases street cars were struck by steam locomotives. The fatal accidents occurred at Des Moines, Iowa (on the 2d, and also one on the 25th); at Marysville, Mich.; Reading, Pa.; Newcastle, Pa.; Seattle, Wash., and Yonkers, N. Y. In the Seattle accident the number of persons injured was reported as 80; in a butting collision at Wilkesbarre, Pa., 62, and in a crossing accident at St. Louis, where a locomotive struck a street car, 40.

TRAIN ACCIDENTS IN OCTOBER.¹

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of October, 1909. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officer. It is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation:

Collisions.

Date.	Road.	Place.	Kind of	No. persons		
				Accident.	Train.	reported
1.	Pennsylvania	Youngstown.	xc.	P. & Ft.	1	5
2.	C. M. & Pgt S.	Garrison, Mont.	bc.	Ft. & Ft.	4	3
5.	Ill. Cent.	Parnell.	bc.	P. & P.	1	70
5.	Mich. Cent.	Lapeer.	bc.	Ft. & Ft.	1	1
5.	St. L. & S. F.	Blytheville.	bc.	P. & Ft.	0	14
6.	Chic. B. & Q.	Ardmore, S.D.	rc.	Ft. & Ft.	1	0
9.	A. T. & S. F.	North Topeka.	bc.	Ft. & Ft.	16	2
9.	Cent. of N. J.	Siegfried, Pa.	xc.	Ft. & Ft.	2	3
10.	Mo. K. & Tex.	Troy.	bc.	P. & Ft.	0	3
12.	Mo. K. & Tex.	Greenville.	rc.	Ft. & Ft.	5	20
16.	Mo. Pacific	Leeds.	bc.	P. & Ft.	0	12
17.	Mo. K. & Tex.	Halstead.	bc.	P. & Ft.	2	5
18.	A. T. & S. F.	Magdalena.	xc.	Ft. & Ft.	1	0
22.	Pennsylvania	Collinsville, O.	bc.	P. & Ft.	6	5
23.	Virginia & S.W.	Duffield.	xc.	Ft. & Ft.	1	0

* Abbreviations and marks used in Accident List:

rc, Rear collision—bc, Butting collision—xc, other collisions—
b, Broken—d, Defective—unf, Unforeseen obstruction—unx, un-
explained—derail, open derailing switch—ms, Misplaced switch—
acc. obst., Accidental obstruction—malice, Malicious obstruction of
track, etc.—boiler, Explosion of boiler of locomotive on road—fire,
Cars burned while running—P. or Pass., Passenger train—F. or Ft.,
Freight train (includes empty engines, work trains, etc.)—Asterisk,
Wreck wholly or partly destroyed by fire—Dagger, One or more pas-
sengers killed.

Date.	Road.	Place.	Kind of	No. persons
			Accident.	reported
26.	Union Pacific	Laramie.	xc.	Ft. & Ft.
27.	Gulf, C. & S. F.	Temple.	bc.	Ft. & Ft.
29.	N. Y. Cent.	Rochester.	xc.	Ft. & Ft.
29.	Erle.	Toisin.	bc.	P. & Ft.
31.	C. N. O. & T. P.	Danville.	bc.	Ft. & Ft.

Derailments.

Date.	Road.	Place.	Cause	Kind	No. persons
			of derimt.	of train.	reported
5.	St.L., I.M. & S.	Hilliard, Mo.	acc. obst.	Pass.	2
6.	Gulf, C. & S. F.	Temple.	malice.	Pass.	1
6.	Spokane, P. & S.	Fountain.	acc. obst.	Pass.	1
18.	Tenn. & C. S.	Maryville.	cow.	Pass.	1
18.	C. R. I. & P.	Greene.	acc. obst.	Pass.	1
13.	Austin & N. W.	McNeil.	fire.	Pass.	8
15.	St. L. & S. F.	Muskogee.	animals.	Pass.	1
17.	N. Y. Cent.	Rhinecliff.	b. rail.	Pass.	10
21.	Ore. R. & N.	Hood River.	d. track.	Ft.	1
21.	Erle.	Guymard.	neg.	Ft.	2
24.	C. C. C. & St.L.	Gano.	boiler.	Ft.	3
30.	Wabash	Pattonsburg.	unx.	Pass.	12
30.	Pennsylvania	Hannastown.	d. rail.	Ft.	1

Other Accidents.

30.	Coal & Coke	Elkins, W.Va.	boiler.	Ft.	5
31.	L. S. & M. S.	Geneva.	boiler.	Ft.	1

The collision at North Topeka, Kan., on the eighth, was between a work train moving backward and a freight, and 15 of the 50 laborers on the work train were killed. One trainman also was killed and two were injured. It appears that the work train was occupying the main track on the time of the freight, and had failed to send out a flagman to protect itself against the freight. The Kansas state commissioner of labor, who, in his official capacity, attended the inquest following this collision and investigated the circumstances, has written a letter to the road calling attention to the fact that the dispatcher's orders given to these two trains were not sufficiently clear and simple. The coroner's jury had found that the trouble was careless reading of orders on the part of the men in charge of the work train. The labor commissioner says:

"I have examined train orders Nos. 7 and 8 of October 8, in both of which orders appeared engine No. 183, one bound east and the other bound west, thus directing movements of the same engine by number in opposite directions within a period of one and three-fourths hours. These two were issued at the same time, delivered to Conductor C. E. Brown at the same time and were misinterpreted by Conductor Brown, Engineer McKeirnan and other trainmen, because of the sameness of the engine number operating in opposite directions, thus creating confusion. While this is not sufficient to exonerate the trainmen in charge of the train from blame, it was sufficient to demonstrate that the wreck in all probability could have been avoided had not those engine numbers been used in these two orders in this way."

And he goes on to tell how this error should be guarded against in the future.

The butting collision of passenger trains at Parnell, Ill., on the fifth, occurred about 10 p.m. One passenger was killed and 65 passengers and 5 trainmen were injured. The trains met on a curve and both were running at 30 or 40 miles an hour, making a very bad wreck. The northbound train was heavily loaded with passengers returning from the state fair at Springfield. This was a special train, and it had no rights over the southbound, which was a regular train. The explanation of the accident is that the conductor misread his watch and by the wrong reading took 15 minutes more on the time of the regular train than he had a right to take. This, of course, leaves unexplained the responsibility of the engineman for running on the time of the regular train. According to one of the newspaper accounts, the conductor was using a borrowed watch, the dial of which was set in a different position, as related to the top of the case, from that of the dial of his own watch, and this, the conductor says, explains how he came to make the mistake in reading.

The victims of the collision at Greenville, on the twelfth, were men riding in a freight car taking care of horses.

The collision at Collinsville, Ohio, on the twenty-second,

is reported as due to a misplaced switch. The passenger train southbound, approaching Collinsville at 50 miles an hour, was turned into a siding and into the head of a freight train standing thereon. Both engines, two cars of the passenger train and six cars of the freight were wrecked. The wreck took fire but the flames were soon extinguished. The testimony at the coroner's investigation indicated that the forward brakeman of the freight train set the switch in the wrong position, though the brakeman himself denied it. The engineman and the fireman of the passenger, the engineman of the freight, three mail clerks and one trespasser were killed, and several passengers and a number of trainmen were injured.

The butting collision of freight trains on the thirty-first occurred between Danville and Somerset, and the engineman of one of the trains was killed; the other engineman and one brakeman were injured. The road was blocked about six hours. The line of this road is equipped with automatic block signals, and the presence of two trains moving in opposite directions toward each other in the same block section is explained as due to the engineman of the northbound train failing to heed the automatic block signal indication, and the neglect of the operator at Moreland to deliver an order to the southbound.

In the collision of Youngstown, Ohio, on the first, a passenger train of the Pennsylvania, running at full speed, was struck in the side by some freight cars being backed out of a side track. The cars struck the tender a diagonal blow, checking its progress violently, and the engine, from which both the engineman and fireman were thrown off, ran uncontrolled several miles through the city, finally colliding with a freight train, the engineman of which was fatally injured. The passenger fireman, who was knocked off, was also reported fatally injured. The freight was a switching train of the Erie road.

In the collision at Siegfried, Pa., on the ninth, a through freight train, in which were 17 cars of cattle, ran into a switching engine at a crossover track. Both locomotives and seven cars of live stock were wrecked. Two of the persons reported injured were women who had come out to see the spectacle, and who were attacked by bulls which escaped from the broken cars.

The derailment near Temple, Tex., was due to the partial misplacement of a switch, and all of the cars in the train were overturned; but only six passengers are reported as injured. The engineman was fatally injured and the fireman less severely. Two mail clerks were slightly injured. The switch had been disconnected from the switchstand, apparently by the use of explosives, and the company has offered a reward of \$5,000 for the arrest and conviction of the persons guilty of the outrage.

Of the 20 accidents to electric cars reported in the newspapers of the United States in the month of October, four resulted in the death or fatal injury of two persons each. These were at Pittsburgh, Pa., Columbus, Ga., Detroit, Mich., and Denver, Colo. Five others resulted in injuries to considerable numbers of persons each. A collision at Cleveland, Ohio, on the twenty-first, injuring seven persons, occurred in front of the city hospital, and the injured were taken into the hospital and placed on operating tables within four minutes after the collision occurred. The accounts say that one of the victims would have bled to death but for this prompt attention.

In a butting collision between a passenger train and a freight on the Intercolonial Railway at Nash Creek, N. B., October 6, two enginemen and an express messenger were killed; and in a similar collision on the Canadian Pacific, near White river, on the seventeenth, three trainmen were killed.

ELECTRIFICATION IN ITALY AND SWITZERLAND.*

In Italy considerable progress is being made. The government has decided to electrify eleven sections on the State Railways, aggregating 337 miles of track, but on the 3-phase system. Thus the battle of the phases is still undecided. The decision of the Italian State Railways to use 3-phases, while in Germany, Austria, England, Sweden, and America the single-phase system is preferred, is highly interesting. I have asked Mr. Verola, the chief engineer of the electrical department of the Italian State Railways, what were the reasons for this decision, and he says:

"The decision to use the 3-phase system is not final and absolute for our administration, but the latter considers it preferable as a beginning for the lines at present under electrification. The possibility to use the single-phase system in other cases, which may better lend themselves to it, is thereby not excluded. In the case of the three lines (Pontedecimo-Busalla, Bardonecchia Modane, and Savona-Ceva) which are about to be opened, the service is extremely heavy, trains of 400 tons and over having to be hauled up on long grades of 25 to 35 per cent. at a speed of 45 km. per hour. With the 3-phase system it is possible to comply with these conditions by using two locomotives. These weigh each 60 tons, and develop each at the 1-hour rating 2,000 h.p. They have five driving axles and two motors, which are placed above and between the three middle axles. Connecting rods transmit the motion from the motor to the driving axles. The 3-phase system has the advantage that in running downhill the speed cannot exceed a certain limit, while recuperation of energy is possible. With the single-phase system the weight of the motors would be at least doubled, resulting in a greater expenditure of energy, more especially as we shall be obliged always to use two locomotives to each train. The advantages of wider speed adjustment in running and better efficiency in starting are not of importance, since the grades are long and fairly uniform, and the distance between stations is great, while the latter are all on the level. Thus it is probable that also some future electrifications will be on the 3-phase system, notably that of the prolongation of the Valtellina line to Milan, which will shortly be taken in hand. It is, however, highly probable that some other lines will be worked single-phase. One of these is the line Turin-Pinerolo-Torre-Pelice, where widely different speeds are necessary, the maximum being 80 km. per hour for 100-ton passenger trains."

I have given the substance of Mr. Verola's letter at some length, as it appears to me an admirably clear and unbiased statement regarding the relative advantages of the two systems.

In Switzerland the federal government appointed some years ago a committee of electrical and railway engineers to report generally on the question of electrifying the Swiss railways. The first report dealt with the amount of power required, and urged the government to secure water-power rights in time. The average power was estimated at 100,000, and that at peak time at 500,000 h. p. In a second report some standards as to weight and speed of trains, acceleration, horse-power required in starting and running, time interval between trains, and other matters connected with the future electrical service were suggested, while a third report dealt with the question of a standard frequency; but on the question whether the single or the 3-phase system is to be chosen the committee has not yet pronounced an opinion. From private conversations I have had with Swiss railway men, I incline to the belief that the decision will be in favor of the single-phase system, especially since by the use of the Deri type of motor it has been found possible greatly to simplify and also lighten the accessory equipment. The first test of this motor for traction was made on the 3-phase Engelberg railway, 1 phase only being used.

*From an address by Dr. Gisbert Kapp, before the Institution of Electrical Engineers, London, Nov. 11.

BENJAMIN L. WINCHELL.

Benjamin L. Winchell, who has resigned as president of the Chicago, Rock Island & Pacific, the Chicago, Rock Island & Gulf and the Chicago, Rock Island & El Paso, and has been elected president of the St. Louis & San Francisco, succeeding A. J. Davidson, and of the Chicago & Eastern Illinois and the Evansville & Terre Haute, succeeding H. I. Miller, although he was president of the Rock Island for five years, is now only 51 years old. He not only became a railway president unusually young but another exceptional feature of his career is that he came up from the passenger department. More railway presidents rise from the operating department than from any other one department and of those who come up from the traffic department a large majority are freight traffic men.

The rapid progress which Mr. Winchell has made probably is due as much to his broad experience in railway affairs and to his remarkable diplomacy in dealing with both the patrons and the employees of railways as to his marked executive ability. While Mr. Winchell came up from the passenger department his experience is a great deal broader than that of most railway executives. His first employment in railway service was that of a clerk in the office of the superintendent of machinery on the Hannibal & St. Joseph, now a part of the Burlington. He next became chief clerk in the general freight and ticket office of that road, and it was from this position that he was promoted to assistant general passenger agent of the Atchison & Nebraska, now a part of the Burlington. He continued to be strictly a passenger man until December, 1898, when he was made vice-president and traffic manager of the Colorado & Southern. In October, 1900, he became general manager as well as president of the Kansas City, Ft. Scott & Memphis, and on the sale of this road to the Frisco he went with the latter road as vice-president and general manager. Subsequently, as third vice-president of the Chicago, Rock Island & Pacific, he had charge of all departments of the service on that road, being even before he became its president its chief executive officer in the West.

The passenger men are the diplomats of the railway service and Mr. Winchell has justly earned the reputation of being one of the most tactful railway managers in this country. When he became the head of the Rock Island in 1904 he was confronted with a very difficult situation. The road had had frequent changes in management for some years. Its physical condition was bad. Worse than this the relations of the management both with its patrons and with its employees were unsatisfactory. The relations between the management and subordinate officers and employees are well illustrated by the remark of a division superintendent at the time that "he

always feared to open a personal letter from any of his superiors for fear he would find a man in it."

It was one of Mr. Winchell's main duties to establish more harmonious relations between the railway and its patrons on the one side and its employees on the other, and he was admirably fitted for the task. The door of his office in Chicago was always open to anyone who had any business with him. He surrounded himself with men whose methods of dealing with the public and with employees were similar to his own. He refused no invitation to meet with commercial bodies along the line and even to address them when time would permit. He took advantage of every reasonable opportunity to confer with business men regarding the mutual interests of the railway and the territory which it served. Meantime, he adopted the policy of making as few changes as possible in subordinate official positions and of seeking to promote efficiency in operation by gaining the loyalty of all classes of officers and employees rather than by bringing in new men of his own choosing. To put the road in good physical condition required large expenditures, and an officer who is thoroughly familiar with the work that has been done estimates that for this purpose an average of \$5,000,000 a year was spent during Mr. Winchell's administration. Few extensions of the property were made, Mr. Winchell's work being one of intensive rather than extensive development. The result of all these things was that at the close of his administration the road was in the best physical condition in its history, had a harmonious organization of officers and employees, was efficiently operated, and had the friendship of the communities along its lines in as great a measure, perhaps, as any other railway in the country.

Mr. Winchell's methods of work are what would naturally be expected of a man of

his tactful, unruffled temperament. He has a strong grip on details and at the same time a capacity for disposing of them with extraordinary facility. He is still young and in possession of vigorous health. On returning to the Frisco as its president, he resumes work on a property and in a territory with which he is thoroughly familiar. He is no stranger to the Chicago & Eastern Illinois and the Evansville & Terre Haute, as he was formerly vice-president of both these properties.

Mr. Winchell began railway work in July, 1873, as clerk in the office of the superintendent of machinery and was later in the office of the auditor of the Hannibal & St. Joseph. In November, 1877, he was made chief clerk in the general freight and ticket office and later assistant general passenger agent of the Atchison & Nebraska. He was then consecutively chief clerk in the general passenger department and assistant general passenger and ticket agent of the Kansas City, Fort Scott & Gulf, now a part of the Frisco, and the Kansas City, Lawrence & Southern Kansas, now a part of the Santa Fe; assist-



B. L. Winchell.

ant general passenger and ticket agent of the Kansas City, Ft. Scott & Memphis and the Kansas City, Memphis & Birmingham, now parts of the Frisco; general passenger and ticket agent of the Union Pacific, Denver & Gulf and the Denver, Leadville & Gunnison, now parts of the Colorado & Southern. In May, 1898, he was appointed general passenger agent of the St. Louis & San Francisco and later in that year was made vice-president and traffic manager of the Colorado & Southern. He was elected president and general manager of the Kansas City, Ft. Scott & Memphis in October, 1900, and two years later was elected vice-president and general manager of the St. Louis & San Francisco. On October 15, 1903, he was elected first vice-president of that road, third vice-president of the Chicago, Rock Island & Pacific and vice-president of the Chicago & Eastern Illinois and the Evansville & Terre Haute, and in April, 1904, he was elected president of the Chicago, Rock Island & Pacific.

HENRY U. MUDGE.

Henry U. Mudge, second vice-president of the Chicago, Rock Island & Pacific, has been elected president, succeeding B. L. Winchell, resigned.

The election of Mr. Mudge as executive head of the Rock Island is one of a long series of promotions which have steadily come to him ever since he entered railway service as water boy of a section gang on the Atchison, Topeka & Santa Fe 37 years ago. It has been said that Mr. Mudge began work as a water boy at \$1.50 a day. The truth is he began work as a section hand when he was 16 years old at \$1.50 a day, and as there was not quite enough work for him to do in that capacity, the Irish foreman said "set the by to carrying water," so he carried water at a regular section hand's pay. He graduated from section hand into a telegraph operator. He says himself that he was a "ham" operator; in fact, about the worst "ham" operator that a road ever had.

There has been nothing spectacular about Mr. Mudge's career any more than there is about him personally. Each promotion has led from the office he held to that immediately in advance of it, each being gained by hard work, mastery of detail and the exercise of the great good sense and good judgment that are his most marked characteristics. His five years' service as general manager of the Atchison, Topeka & Santa Fe, and a subsequent service of almost five years as second vice-president of the Chicago, Rock Island & Pacific, during a period when these properties were undergoing extensive rehabilitation, in which he had an important part, and were enjoying an unprecedented growth of traffic, have admirably equipped him to be the chief executive of the Rock Island.

In an interview with the Chicago press immediately after his appointment, Mr. Mudge indicated very frankly what his

policy as president of the Rock Island is to be. He said that in filling official positions which have been rendered vacant by dissolution of the Rock Island-Frisco combination, the Rock Island would promote men in its own service rather than go outside for them.

Mr. Mudge is democratic in dealing with his associates, his subordinates and with the patrons of the road, and is extremely popular with them. All his railway service having been in the territory in which the Rock Island operates, he is thoroughly familiar with its resources and needs.

Mr. Mudge was born June 9, 1856, at Minden, Mich. He received a common school education and began railway work in 1872 on the Atchison, Topeka & Santa Fe. He was consecutively telegraph operator, brakeman and baggageman, conductor on freight, passenger and work trains, train dispatcher, roadmaster, trainmaster and assistant superintendent. In July, 1889, he was made superintendent of the Rio Grande division, and four years later was transferred to the Western division at Pueblo, Colo. He was later made general superintendent of the Western grand division. In June, 1894, he was transferred to the Eastern grand division, and in February, 1896, when the Atchison, Topeka & Santa Fe was reorganized, he was appointed a general superintendent. In January, 1900, he was appointed general manager. He was elected second vice-president of the Chicago, Rock Island & Pacific in May, 1905.

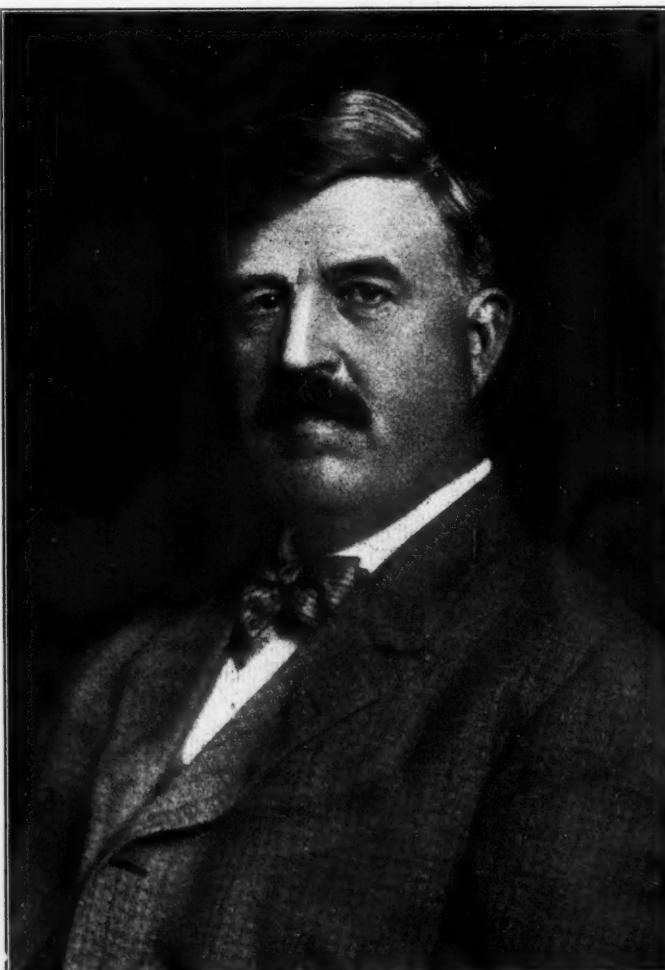
FOREIGN RAILWAY NOTES.

A Belgian law of August 20 relating to the use of white lead allows the importation, sale, transportation and use in Belgium of painters' white lead only in form of paste and oil, and prohibits the dry scraping or pumicing of any surface coated with white lead. The importation of white lead in powder, lump or cake form is allowed for other purposes than for the manufacture of paint.

The Buenos Ayres Great Southern has been authorized to build a line from Olavarria to Balcarce, by way of the district of Tandil.

An agreement has been made between the Argentine government and the Northeastern Railway of Argentine under which a ferry service is to be put in operation connecting the lines of the Northeastern with those of the Paragua Central.

The Department of Public Works, Norway, is about to begin building a narrow gage branch railway from Myrdal, on the Christiania & Bergen Railway, to Fretheim, a distance of about 10 miles. About a mile of this road is to be rack railway. The motive power on the line is to be electricity, and the estimated cost of building is about £90,000 (\$450,000).



H. U. Mudge.

BENJAMIN F. YOAKUM.

Benjamin F. Yoakum has been elected chairman of the executive committee of the St. Louis & San Francisco, and this property is now to be operated and managed independently of the Chicago, Rock Island & Pacific. Mr. Yoakum's name is connected inseparably with the development of railways in Texas. He knows the country, believes in it himself, and has been successful in his efforts to interest others in the development of the state. Hostile as has been the legislation against railways in Texas, there have been few attacks on Mr. Yoakum personally or on his methods.

His attitude toward this hostile legislation has been that of a broad-minded man, who realizes that many mistakes are made from ignorance. Mr. Yoakum has tried consistently, through his own public utterances and in every legitimate way, to convince the people, and especially the farmers, that their own best interests are served by the development and expansion of railways.

Mr. Yoakum's experience in railroading has been broad and his training has been thorough. He has served in both the traffic and the operating departments of various roads, and, as an executive officer, he has reduced the problem of getting at the facts in a matter under investigation, without reading documents on the subject, down to a science. His assistants prepare careful reports on subjects on which Mr. Yoakum wants information. The principal advantage of having matters prepared in the form of a report is that in this way the assistant gets the subject clearly in mind and the reports serve as a record. Mr. Yoakum does not read it; he asks the assistant to tell him what it contains.

Previous to 1888 Benjamin F. Yoakum was traffic manager and assistant general manager of the San Antonio & Aransas Pass, and on January 1, 1888, was made general manager. In July, 1890, he was appointed receiver, and in September, 1892, became traffic manager of the Sap. After a few months in this position he left railway service for nearly a year, coming back in April, 1893, as general manager and third vice-president of the Gulf, Colorado & Santa Fe. In July, 1896, he was made vice-president and general manager of the St. Louis & San Francisco, becoming president in June, 1900, and retaining the office of general manager up to July, 1901, when he turned these duties over to another, remaining president until 1904. From 1902 to 1904 he was also president of the Chicago & Eastern Illinois, serving, as well, as president of the Evansville & Terre Haute for a few months in 1904. When the Rock Island took over the control of the St. Louis & San Francisco Mr. Yoakum became chairman of the executive committee of both companies. Since 1904 he has been president of the St. Louis, Brownsville & Mexico. The separation of the

Rock Island and the Frisco and the resignation of D. G. Reid as chairman of the board of directors of the Frisco makes Mr. Yoakum the controlling head of the St. Louis & San Francisco. The prospects of this company were discussed last week in these columns.

FILING TARIFFS ON THE OREGON SHORT LINE.

A method of filing tariffs is in use on the Oregon Short Line which is believed to differ from that in use on any other road. The tariffs in the general freight office at Salt Lake City and in each of the stations are arranged according to the diagram shown in the accompanying illustration. The general freight office case is composed of drawers, each of the

numbers in the diagram representing a drawer. The tariffs in the stations are placed in books, each of the numbers in the diagram representing a book. The numbers on the drawers in the general freight office correspond to the numbers on the books in the stations. An important difference is that the numbers on the drawers in the general freight case are printed in three different colors, some blue, some red and some green, while those on the books in the station cases are all printed in black.

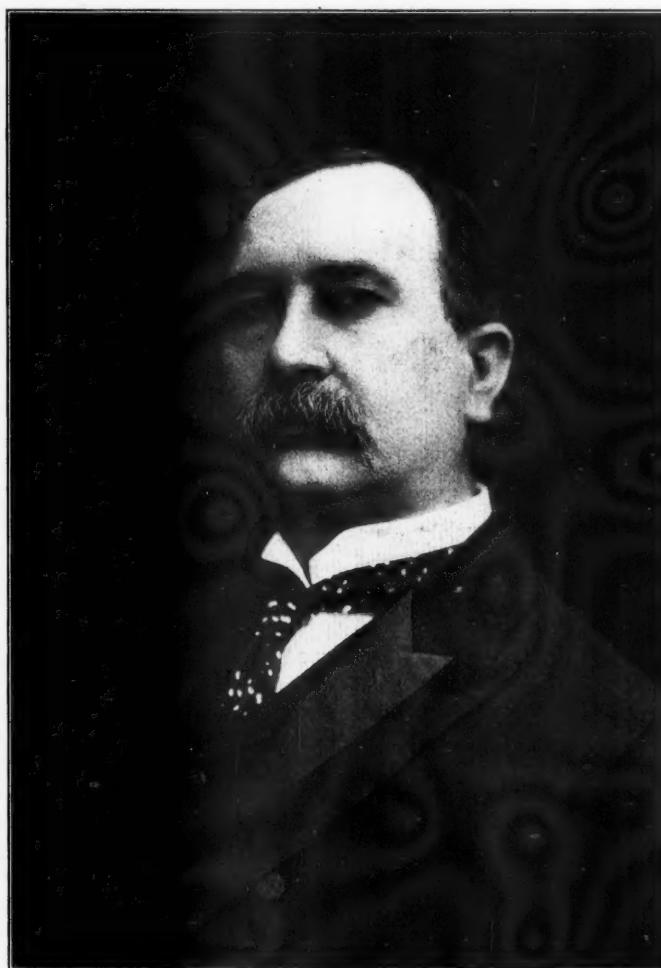
The method of arranging tariffs is as follows:

1. *Miscellaneous publications*, the numbers for which are 1 to 9, inclusive, and 11 to 20, inclusive, and which on the drawers of the general freight office case are printed blue. These include general circulars, terminal, switching, demurrage tariffs, etc., company material tariffs, supply tariffs, such as for hotels, dining cars, etc., fair, exposition and circus tariffs, and classifications and exceptions.

2. *Special commodity tariffs and circulars pertaining thereto*, the numbers for which are printed green on the drawers of the freight

office case, and which are 29 to 40, inclusive; 55 to 60, inclusive; 72 to 80 inclusive; 91 to 100, inclusive; 117 to 120, inclusive, and 134 to 140, inclusive. These tariffs are filed according to commodities as follows: Lumber, ore and bullion, fruits and vegetables, live stock, emigrant movables, wool, hides and pelts, coal and coke, cement, lime and plaster, salt and sulphur, sugar and molasses, oil, cotton factory products, iron and steel, peanuts, tobacco, grain flour, mill stuffs and hay.

3. *Merchandise or general class and commodity tariffs*. The numbers for these on the general office tariff case are printed red, and are 10; 21 to 28, inclusive; 41 to 54, inclusive; 61 to 71, inclusive; 81 to 90, inclusive; 101 to 116, inclusive; 121 to 133, inclusive, and 141 to 160, inclusive. These tariffs are filed according to territory under the following plan: A, beginning on the right (east on the map) tariffs to and from Atlantic Seaboard, Trunk Line, Gulf and Southeast, and Central Traffic Association territory. B, next in order to the



B. F. Yoakum.

left (west), tariffs to, from and within Western Trunk Line territory. C, next in order to the left, application sheets Western Trunk Line territory. D, next in order to the left, Utah common points, Montana common points, Oregon Short Line local territory, etc. E, next in order to the left, North Pacific coast. F, next in order to the left, Central Pacific coast (Southern Pacific Company). G, next in order to the left, South Pacific coast (San Pedro, Los Angeles & Salt Lake).

As already indicated, tariffs are filed in the stations in an order corresponding exactly with the way that they are filed in the general freight office. Each publication mailed to station agents, except division sheets, which are not placed in the tariff file, has printed or stamped at the bottom of the title page the number of the folio in which it is to be placed. Not all publications on file in the general freight office are mailed to agents, but those which are mailed, being those affecting the particular station, occupy the same position in all files. Oregon Short Line Tariff Circular, No. 4,000 A, indicates all publications on file at each station and in what folio they are filed. If a publication for any reason cannot be kept in the folio in which it properly belongs, a cross refer-

OREGON SHORT LINE RAILROAD COMPANY
GENERAL FREIGHT DEPARTMENT

RATE BULLETIN No. 34

Attention of Shippers is Respectfully Invited

TO NEW TARIFF

APPLYING ON

Classes and Commodities

BETWEEN

Stations on the Southern Pacific Company
Calvada, Nevada, and East

AND

Stations on the Great Northern and Northern Pacific
Railways, North of Butte, Montana, to Helena,
Montana, latter inclusive.

For Particulars see O. S. L. Tariff No. 3578 on File at this Station
EFFECTIVE OCTOBER 15th, 1909.

J. A. REEVES,
General Freight Agent.

Salt Lake City, Utah, September 13th, 1909

File 9524 (150)

Announcement of New Tariff.

ence sheet must be kept in that folio to indicate why the publication is missing and where it may be found. This cross reference sheet gives the O. S. L. and the I. C. C. numbers of the publication, contains a brief description of it, the place where it may be found, and indicates why it is not filed in the folio, as, for instance, because it is too bulky or contains rates or rules requiring filing also in some other folio, or is out of stock, and that a copy of the re-issue will be filed as soon as received.

When a publication is canceled in full by a subsequent publication it is stamped as follows on the title page, for which purpose a stamp is furnished to each agent:

VOID.

After 1909.
See

The date when the old publication will become void and the publication which will supersede it is indicated in the blanks and the new publication is held in a separate drawer or other convenient receptacle until it becomes effective. The new publications so held are arranged in the order of the dates on which they become effective, and the agent is required to consult this file of new publications daily, placing the new publications in the proper tariff books as soon as they become effective and removing canceled or expired publications. New supplements must be placed in tariff books im-

1	21	41	61	81	101	121	141
2	22	42	62	82	102	122	142
3	23	43	63	83	103	123	143
4	24	44	64	84	104	124	144
5	25	45	65	85	105	125	145
6	26	46	66	86	106	126	146
7	27	47	67	87	107	127	147
8	28	48	68	88	108	128	148
9	29	49	69	89	109	129	149
10	30	50	70	80	110	130	150
11	31	51	71	91	111	131	151
12	32	52	72	92	112	132	152
13	33	53	73	93	113	133	153
14	34	54	74	94	114	134	154
15	35	55	75	95	115	135	155
16	36	56	76	96	116	136	156
17	37	57	77	97	117	137	157
18	38	58	78	98	118	138	158
19	39	59	79	99	119	139	159
20	40	60	80	100	120	140	160

Diagram of Tariff Case.

mediately on receipt and canceled supplements removed, as all added or amended items or cancellations of items are carried forward in the new supplements. All canceled or expired publications are required to be retained in the station for record. They are taken out of the tariff box and placed in letter files, or in any convenient place, in folio order. Of course, the method of handling publications in the general freight office is similar to that used in the stations.

The rules of the Interstate Commerce Commission require that all tariffs containing rates from or to any station must be on file at that station 30 days in advance of the date on which they become effective, and that this file of tariffs, together with a complete index of what it contains, must be kept accessible to public inspection, notice to that effect being posted in conspicuous places in waiting rooms and freight offices, and agents and office employees of the Oregon Short Line are required to familiarize themselves with the publications on file at the stations and to be prepared to exhibit them on request, "rendering every assistance in their power to any person seeking information therefrom." The Commission also requires carriers to have their agents post from time to time in a public place, in waiting rooms or offices, a brief bulletin notice of changes in rates from that station and the commodities which they affect. In each station of the Oregon Short Line a bulletin board is provided. The bulletin shown was printed in red ink.

Each of these bulletins is printed in a different color so as to make them conspicuous and to attract as much attention to them as possible. Agents of the Oregon Short Line are required to post the bulletins immediately on receipt and to bring them to the attention of shippers who are likely to be interested in the changes.

DANIEL G. REID.

The election of Daniel G. Reid as chairman of the executive committee of the Chicago, Rock Island & Pacific to succeed Benjamin F. Yoakum marks the return on the part of those in control of the company's affairs to a singleness of purpose and harmony that had been rather disturbed during the time that the Rock Island had the Frisco on its back.

Mr. Reid is not a railway man at all in the sense that he has worked up from the ranks in that business. A country boy, brought up on a farm in a small Indiana village, where he worked for years first as a messenger and later as janitor of the bank, he is to-day considered one of the most diplomatic and cosmopolitan capitalists in New York. His personality is so devoid of "striking" characteristics that it is at first difficult to tell why he impresses one at once with the strength and great capacity which he abundantly possesses. Quiet, almost smooth, and with a keen sense of humor, he seems rather like a man who had been born to wealth than one who has achieved it by hard work.

His connection with the Chicago, Rock Island & Pacific came about in 1901 when he, the Moores and William B. Leeds sold out their American Tin Plate, National Steel, and other allied companies to the United States Steel Corporation, receiving an aggregate, it was said at the time, of something like \$140,000,000. They thought that they saw an opportunity to develop a great railway system, beginning with the purchase of the Chicago, Rock Island & Pacific, then operating only about 3,800 miles of road. They had abundant capital and bought in one road after another to round out the Rock Island property, and while doing so they grossly inflated the Rock Island capitalization.

In the main, the selection of properties which they made was exceptionally good. Nearly all of the properties, however, needed considerable sums spent for improvement. The purchase of the majority of the stock of the St. Louis & San Francisco appeared at the time to be another step in the development of the Rock Island system, but the Frisco, notwithstanding its own really great future prospects, was a burden to the Rock Island, and the joint interests in control were not altogether harmonious. Now, however, with the St. Louis & San Francisco operated and controlled entirely independently of the Rock Island, there is apparently perfect singleness of purpose in the management, and it is understood to be Mr. Reid's intention to devote himself entirely to the development of his railway property.

Daniel G. Reid was born in Richmond, Ind., in 1858, of Scotch-Irish parentage. His father was a farmer, who, about the time that his son was five or six, was appointed postmaster in Richmond and later ran a grocery store as well as acting as postmaster. When he was 16, Daniel Reid began

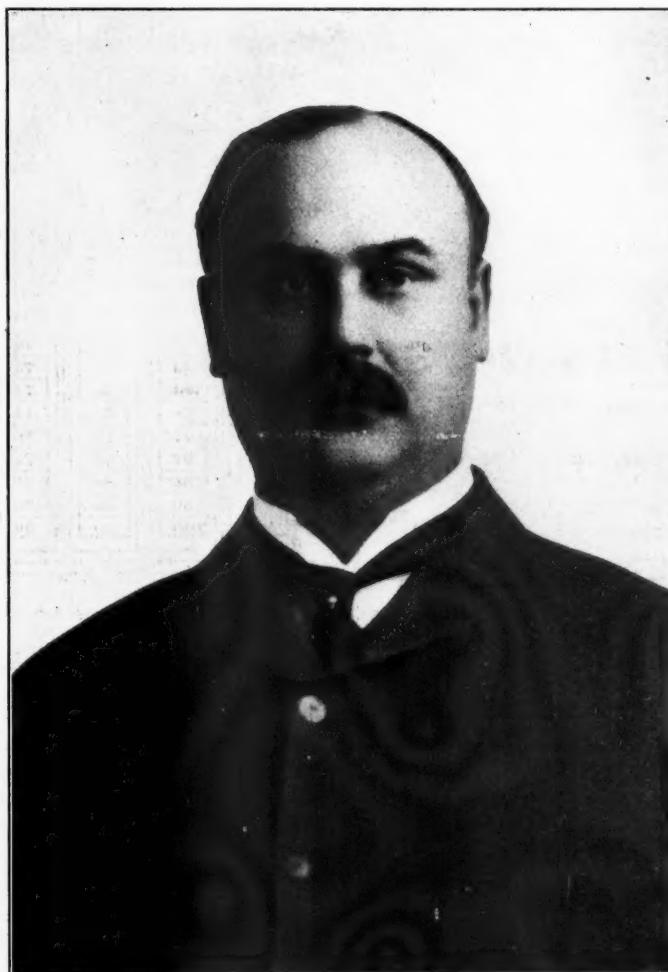
work in the Second National Bank of Richmond for about \$200 a year. He married when he was 21. He was advanced slowly to cashier and later vice-president of the bank, and became interested, together with William B. Leeds in the manufacture of tin plate. These two men—Leeds a railway superintendent and Reid a bank cashier—succeeded in raising capital enough (said to be about \$250,000) to build a tin plate mill, but it was a complete failure and after two years was assigned to the scrap heap. However, enough additional capital was interested to build two more mills in the natural gas region near Elmwood, Ind. At this time tin plate was manufactured almost exclusively in Wales, and there were no successful mills in the United States. These two mills, however, were built and managed so differently from the first one that business became tremendously profitable in a very short time. Other mills were organized, and in 1898 the American Tin Plate Company was organized by Reid, W. H. Moore and William B. Leeds. Shortly after that these men organized the National Steel Company to supply the raw material for the American Tin Plate, which had taken over almost every tin plate mill in the country. When the United States Steel Corporation was formed, Reid and his associates sold out to the corporation and purchased control of the Chicago, Rock Island & Pacific.

FOREIGN RAILWAY NOTES.

The United States Consul at Mersina writes that further activity on the part of the German engineers of the Bagdad Railway was resumed in the province of Adana, the scene of the recent massacres immediately after the restoration of order. The extension of the line from Constantinople, from Bulgurlu, its present terminus, to Adana, has been surveyed, and when this extension has

been completed there will be a through overland service from Constantinople, the existing Anatolian Railway from Adana to Mersina being the connecting link.

The Italian State Railroads estimated beforehand for the year to June 30, 1909, that their gross earnings would be 462,600,000 lire (\$115,650,000), and their working expenses 335,630,000 (\$83,907,500). The earnings turned out to be 8,900,000 less (\$2,275,000), and the expenses 12,650,000 (\$3,162,500) more than the estimates. A very large portion of the decrease in earnings and the increase in expenses is charged to the Messina earthquake, on account of which a large amount of traffic was carried free, and another part destroyed. The treasury gets 34,490,000 lire (\$8,622,500) from the net earnings. The estimate of this for the next current year is about one-fifth greater; but it will include the profits on the steamer lines to Sicily and Sardinia, which the state has taken over.



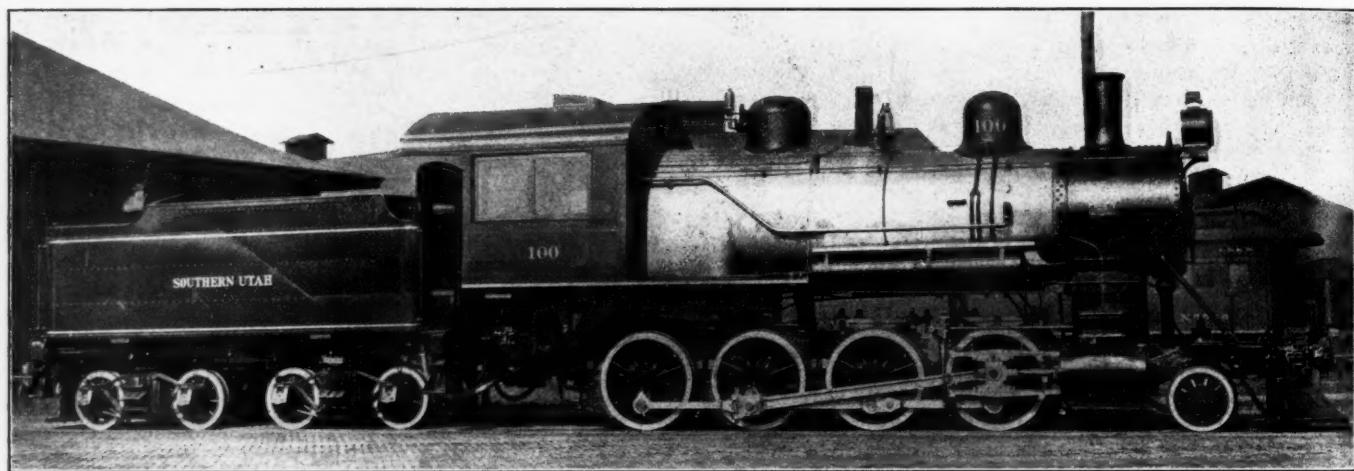
D. G. Reid.

CONSOLIDATION LOCOMOTIVE FOR THE SOUTHERN UTAH RAILROAD.

The Lima Locomotive & Machine Works of Lima, Ohio, has recently built a consolidation locomotive of moderate dimensions for the Southern Utah Railroad, a photograph of which is shown herewith. Cast steel is used for the driving wheels and boxes and the frames and the eccentric straps are fitted with bronze creeper rings. The Stephenson link motion, with plain flat balanced valves, is used.

The following are some of the principal dimensions:

Cylinders	20 in. x 24 in.
Boiler, diameter first ring	.02%
Steam pressure	200 lbs.
Firebox, length	90 in.
" width	66 "
" thickness sides	¾ in.
Tubes, number	250
" diameter	2 in.
" length	14 ft.
Heating surface, firebox	128.07 sq. ft.
" " tubes	1,823.55 "
" " total	1,951.62 "



Consolidation Locomotive for Southern Utah Railroad. Built by the Lima Locomotive & Machine Works.

Grate area	41.25 sq. ft.
Valves, type	Slide
" travel	.6 in.
" lap	.1 "
" lead	.15 in.
Wheels, diameter, driving	50 in.
Wheels, diameter, truck	30 "
Journals, driving, main	8 ½ in. x 10 in.
" driving, others	8 " x 10 "
" truck	5 ½ " x 10 "
" tender	5 " x 9 "
Wheel base, driving	15 ft.
" total engine	23 "
" engine and tender	.52 ft. 7 ½ in.
Weight on drivers	129,000 lbs.
on truck	19,000 "
" total engine	148,000 "
Tank capacity	5,000 gals.
Coal capacity	10 tons.
Tractive power	32,600 lbs.
Weight on drivers	= 3.95
Tractive power	
Total weight	= 4.53
Tractive power	
Weight on drivers	= 0.87
Total weight	
Tractive power x diameter drivers	= 835.2
Heating surface	
Heating surface	= 47.3
Grate area	
Firebox heating surface	= 6.5*
Total heating surface	
Weight on drivers	= 66.09
Heating surface	
Total weight	= 75.8
Heating surface	

*Per cent.

Displacement, 2 cylinders, cu. ft.	=	8.72
Heating surface	=	223.8
Displacement, 2 cylinders	=	
Grate area	=	4.7
Displacement, 2 cylinders	=	

SWITCH ADJUSTMENT.

BY W. H. ARKENBURGH.

Why are means of adjustment provided in the rods of an interlocked switch? Or, better, why do interlocked switches need adjustment? The average interlocking man will answer, Because rails run, forcing points out of place and thereby changing the throw of the switch, or because the gage of the track does not remain constant, producing the same result. Then let us ask, Why should rails run sufficiently to throw a switch out of adjustment, and why does the gage of the track

vary from day to day? The answer is that rail fastenings are not sufficiently secure, and that natural wear due to friction tends to widen the gage. Therefore, we provide means of adjustment in the rods of an interlocked switch, (1) to overcome the effects of running rails, and (2) to counteract the effects of insecure rail fastenings and of friction. I think that there is also a third reason.

Count the number of parts that go to make up the fittings of an average interlocked switch. Grouped under convenient heads they are as follows:

<i>Bridle rod—</i>	<i>Lock rod—</i>
2 point lugs,	1 screw jaw (3d adjustment),
4 bolts,	1 pin,
4 washers,	1 cotter key,
6 cotter keys.	1 solid rod.
1 screw jaw (1st adjustment)	
2 pins,	
1 jam nut,	
1 solid rod with solid jaw.	
<i>Head rod—</i>	<i>Facing point lock—</i>
2 feet,	1 plunger casting,
4 bolts,	1 plunger,
4 washers,	1 screw jaw (4th adjustment),
1 rod,	2 pins,
2 pins,	2 cotter keys,
6 cotter keys,	1 jam nut.
1 switch adjustment bracket,	
3 bolts for above,	
3 nuts,	
3 washers,	
3 cotter keys.	
<i>Switch adjustment (second adjustment)—</i>	<i>Bolt lock, exclusive of signal connection—</i>
2 thimbles,	1 screw jaw (5th adjustment),
4 jam nuts,	1 jam nut,
1 threaded rod.	1 pin,
	1 cotter key,
	1 casting,
	1 rod.

Often an adjustment (sixth) is provided in the head rod comprising 1 screw jaw, 1 jam nut, 1 pin, 1 cotter, making a total of 78 parts. The number of wearing surfaces in such a set of fittings, exclusive of those existing in the plunger casting, are as follows: point lugs and feet, together with their pins, 20; screw and solid jaws, together with their pins, 40;

bolt lock, 3, a total of 63, and everyone who has had experience in the maintenance of interlocking knows how quickly they wear and require replacement. Therefore, we provide means of adjustment in the rods of an interlocked switch (thirdly) to compensate for the natural wear, due to friction in the parts of the switch fittings, among them the means of adjustment.

In the last analysis is not the present practice of providing such a set of fittings as above enumerated, with means of adjustment in the head, bridle and lock rods, merely an inheritance from the cheap construction of the past? Is it not a tradition like the study of the dead languages in our colleges? I believe so, for reasons which will appear below.

It is possible so to tie together the parts of a switch that if any part runs with the rail the whole must move—ties, ballast and all. And it is possible so to brace the rails that there will be no variation in the gage of the track except that due to wear by friction. As an example I will cite the case of an electric interlocking plant on an eastern road. The main line functions included among others two sets of double slip switches with movable frogs. The rail was 100 lb. A. S. C. E. section. Ordinary good modern practice was followed in the installation of the plant; one gage plate under each pair of points, four ties and the head block strapped together on each side of the points, wrought iron rail braces fastened with spikes. Yet the switch and frog points traveled back and forth with each switching movement a distance of $2\frac{1}{2}$ in. and a heavy engine would cause the head of the rails to spring over badly. The result was that failures were very numerous, and the performance of the plant was most unsatisfactory, so much so that it was determined to rebuild it, so far as track work was concerned, in the best and strongest manner possible.

As rebuilt each slip switch had sixteen gage plates, $\frac{1}{2}$ in. x 6 in., placed as follows: five under each set of switch points, beginning one tie ahead of the head block, and six under the frogs, three under each set of points. These gage plates were held in place by nine $\frac{3}{4}$ -in. x 6-in. lag screws each. There were three lag screws in each rail brace, two between rails and one on each end. The rail braces were of cast iron and butted against $\frac{1}{2}$ -in. x $2\frac{1}{2}$ -in. toe plates, held in place by three rivets each. From end to end of the slips on each side ran a $\frac{1}{2}$ -in. x $2\frac{1}{2}$ -in. strap, fastened by $\frac{3}{4}$ -in. x 6-in. lag screws, one in each tie. Each knuckle was tied to the adjacent stock rail by a piece of 1-in. x 3-in. iron bent in the shape of a "V," the apex bolted to the knuckle and the ends to the stock rail. Each wing rail was secured by a piece of $\frac{1}{2}$ -in. x $2\frac{1}{2}$ -in. iron bolted to its center, the ends turned down and each end secured to two ties by $\frac{3}{4}$ -in. x 6-in. lag screws through the gage plates.

The result of this construction was that thereafter $\frac{1}{8}$ in. was the maximum longitudinal movement of any point, and the gage of the track remained absolutely constant. So strong was the construction that when an engine and three cars were derailed by a broken point and ran through both slips on the ties the only damage to the apparatus was six broken rail braces, three bent plates and one broken lock casting. (I do not count a dwarf signal entirely destroyed.) Not a tie had to be renewed and points did not require readjustment.

The cost of such construction is naturally heavy, but the saving in maintenance charges is in proportion, as is also the satisfaction derived from good operation. Moreover, it is not usually necessary to go to such lengths. On the same road at places where traffic was not so heavy it was found that three or even two gage plates per single switch were amply sufficient, always provided that the rails immediately behind the points were strapped securely to the stock rails, that the ties in sufficient number were strapped together and, most important of all, that the first gage plate was placed on the tie ahead of the head block, for this is the place where the gage of the stock rails begins to widen.

There are extreme cases on mountain grades, where the thrust of running rails might prove sufficient to move a switch bodily if tied as described; but it is always possible to strap together enough ties to make movement very difficult. If, in addition, straps are turned up every 30 ft. for three-rail lengths or more for some distance back of the points, say, and bolted to the web of the rail, there should be very little motion possible.

The source of greatest weakness in interlocking switch construction lies in the excessive use of spikes for holding gage plates, rail braces and tie straps in place. They begin to work loose within four weeks, and it is impossible to tighten them or to put in new ones that will hold. Lag screws give surprisingly greater satisfaction. Bolts would be better yet, but are, of course, inaccessible and hard to remove when making changes or renewals. The source of weakness second in importance to the use of spikes is the multiplicity of parts comprising the fittings of a modern interlocked switch, as enumerated above. This arrangement is a positive source of danger, on account of the liability of cotter-keys to become broken, which breaking allows pins and bolts to work out.

An interlocked switch installed as those on the eastern road above referred to should require but two adjustments. There should be one in the throw rod, the usual "switch adjustment," and one in the lock rod. The switch adjustment is needed to "lose stroke" and to compensate for changes in throw of connections. The lock rod adjustment is needed to compensate for wear and to provide a ready means of renewal. One-half of the lock rod can be made an integral part of the bridle rod, the other half being arranged to bolt to the first. The surfaces in contact should be corrugated and the bolt holes slotted so as to provide for adjustment, and at the same time secure as rigid construction as possible. When the part passing through the plunger casting becomes worn it can be removed and a new part put in place. The number of parts can be greatly reduced, if the points are reasonably long, by combining the bridle rod and its point lugs together with half of the lock rod, as above, in one piece, eliminating the adjustment in the rod itself. The same thing can be done with the head rod—namely, make it of one piece, with its feet and the bracket of the switch adjustment. The bracket may be an integral part of the rod or riveted to it. This does away with all pins and jaws, thereby reducing the number of wearing surfaces to zero, the only ones remaining being in the plunger casting and the switch adjustment. (I believe the bolt lock can be dispensed with. See "Bolt Locking, Railroad Gazette, April 3, 1908.) The switch fittings would now consist of the following parts:

1 bridle rod with point lugs and half of lock rod all in one piece,	4 cotter keys,
4 bolts for lugs,	1 threaded rod,
4 nuts,	2 thimbles,
4 washers,	4 jam nuts,
4 cotter keys,	1 lock rod section,
1 head rod with feet and bracket all in one piece,	2 bolts,
4 bolts for feet,	2 nuts,
4 washers,	2 cotter keys,
4 nuts.	1 plunger casting,
	1 plunger welded or tanged to its connection.

This makes a total of 50 parts, against 78 in the previous case.

Perhaps it may be objected that the construction proposed would be too rigid, and that, especially where short points are used the switch would work with excessive stiffness because of strains set up in the rods. The two points would have to travel in the arc of a circle as a unit instead of individually. I will admit at once that the proposed construction is not applicable to very short points; that is, so far as the elimination of the point lugs and feet is concerned. However, with average length of points, such as are used at high-speed junctions, there would be ample elasticity in the points themselves, in the rods, and in the rail joints, to permit of operation without noticeable stiffness.

Why, then, do we provide means of adjustment in the rods of an interlocked switch?

1. To vary the gage of the switch points to compensate for spreading of the stock rails (wide gage), due to (a) wear, (b) weak bracing of the stock rails.

2. To vary the gage of the switch points to compensate for (c) running rails.

3. To take up lost motion, due to (d) wear of parts of the switch fittings.

a. Wear. This we cannot overcome except by the use of excessively hard steels. Usually the wear is slow and will not cause trouble until the switch rods would require renewal in any case. It could be taken care of by placing thin filler strips between the web of the point and the point lugs or feet.

b. Weak bracing of the stock rails. This can be overcome by construction.

c. Running rails. These can be held in place by strapping ties together in sufficient numbers and by strapping the rail to the ties.

d. Wear of parts of the switch fittings. This can be overcome by reducing the number of wearing surfaces, eliminating separate lugs and feet, pins, jaws.

All things are relative. Some switches are on curves where the wear on the rail is enormous. Some switches are on heavy mountain grades, where several miles of rails would have to be strapped to the ties and the ties together to hold the track. Some switches are situated at points where the traffic is so light as to make the cost of the best construction out of all proportion to the results to be obtained. Some switches have points so short that, to dispense with separate lugs and feet, it would be necessary to loosen the rail joint bolts to a dangerous extent to be able to operate the switch. Therefore, switches must be installed to meet local needs. But is any construction too good for a congested terminal district, a busy trunk line, or a high-speed junction? And, finally, why adjust a switch when it is the gage of the track that needs attention?

PACIFIC LOCOMOTIVE FOR THE WESTERN RAILWAY OF FRANCE.

[WITH AN INSET.]

The Western Railway of France has in service two powerful Pacific locomotives designed by its mechanical department and built at the shops of the company. They are the first of the type that have been used on the road, and are interesting not only because they are examples of the most advanced practice in French design, but also because of their resemblances and departures from American practice; points that will be touched upon from time to time in the course of this description.

The reasons given for the construction of these engines are that the heaviest locomotives heretofore used, that is to say the four-cylinder compound locomotives with six wheels coupled, promised to be incapable, in the course of a few years, of handling the heavy Brittany trains. Besides, not only has the present weight of train to be kept below that demanded by the traffic, but the speed is less than that which the heavy and substantial character of the rolling stock would warrant. The ordinary four-cylinder compounds of the 4-4-0 class are all right for light rolling stock, but are not up to the demands of the later constructions, while a much heavier engine is required for the new coaches fitted in the bogie trucks, of which the number is rapidly increasing.

The weight of the four-cylinder compounds on the drivers is only 99,000 lbs., and this is hardly enough to haul the present weight of train up a 1 per cent. grade, and it was impossible to consider the Atlantic type, since its weight on drivers could not be raised above 79,200 lbs., or 39,600 lbs. per axle, because of the strength of the track. It was, therefore, necessary to turn to six wheels coupled. These considerations naturally forced the adoption of the Pacific (4-6-2) type, and the

result has been the production of a necessarily heavy machine with a grate having an area of about 43 sq. ft., a maximum load per driving axle of 39,600 lbs. and a total weight of about 198,000 lbs.

These weights do not seem excessive in the United States because there is no legal limit to wheel and axle loads as there is in France, and so the engine appears light as compared with those to which Americans are accustomed. For example, the heavy Pacific locomotives designed by Mr. Crawford for the Pennsylvania Lines West, and illustrated in the *Railroad Gazette*, August 30, 1907, has a total weight of 269,200 lbs., of which 163,550 lbs. are upon the drivers, and even this is so distributed that the front pair carries 59,000 lbs., or 51 per cent. more than the French engineers are allowed to use. It is this limitation of weight that has apparently handicapped the designers, for in their statement of the case they acknowledge that it would appear to be a simple matter to merely extend the common ten-wheeler to the rear, put a carrying truck beneath the firebox and the thing is done, but at once it becomes apparent to them that the machine would be too heavy at the rear, as well as too long; and so, in order to avoid both of these difficulties, a great deal of study was put upon the design. Hence the driving wheels were brought together until there was a bare clearance between them, and the rear wheel of the forward truck was crowded close up to the front drivers. The outside cylinders are set between the truck wheels in the usual manner, while the inside cylinders are set in front of them. Then the throat sheet was given a sharp slope to the rear and tubes as long as possible were used. In this, to quote from M. Robert Dubois, the engineer of rolling stock, under whose direction the engine was designed and to whom we are indebted for the drawings and data, "we did not dare go beyond a length of six meters" (19 ft. 8.22 in.). The tube length of the Pennsylvania locomotive is 21 ft.

On the other hand the necessity of making the rear truck wheels as large as possible because of the load on the axle, and the desirability of cutting away as little as possible from the frames, in order that they might clear the firebox and still keep the latter as deep as possible, led to raising the center of the boiler considerably above the previous practice, and it has been put at 9 ft. 6.17 in. above the rails. The Pennsylvania engine stands at 9 ft. 11 in. The steam pressure was fixed at 227 lbs. per sq. in.

In the arrangement of the cylinders the previous practice of the road has been reversed, and instead of putting the low-pressure cylinders between the frames they have been put upon the outside. This change has made a very marked difference in the arrangement of the details of the cross-section of the wheels. Where the low-pressure cylinders were between the frames everything was moved out as far as possible in order to get all the room possible. In this case the opposite has become a necessity because of the limited clearances of the road. And, then, in order to get the room needed for proper lengths of wheel links and journal bearings, the inside eccentrics have been discarded, and the high-pressure valves are driven by an outside gear, which has the further advantage of freeing the space between the frames of this encumbrance.

The firebox is of the Belpaire type and very closely resembles those used in the United States. The main difference lies in the use of copper for the inside sheets and for the staybolts. It is the practice in the United States to drill a telltale hole into the staybolt for a short distance in from the outer end or beyond the inside face of the sheet. In this French locomotive the telltale holes are drilled from the inner end out to and beyond the outer sheet and are only closed by the riveting of the head. No flexible bolts are used, as it is considered that the ductility of the copper renders such a provision unnecessary. That there is an additional stress on some of the staybolts is shown by an increase in the diameter of all those in the outer rows; for, whereas the ordinary

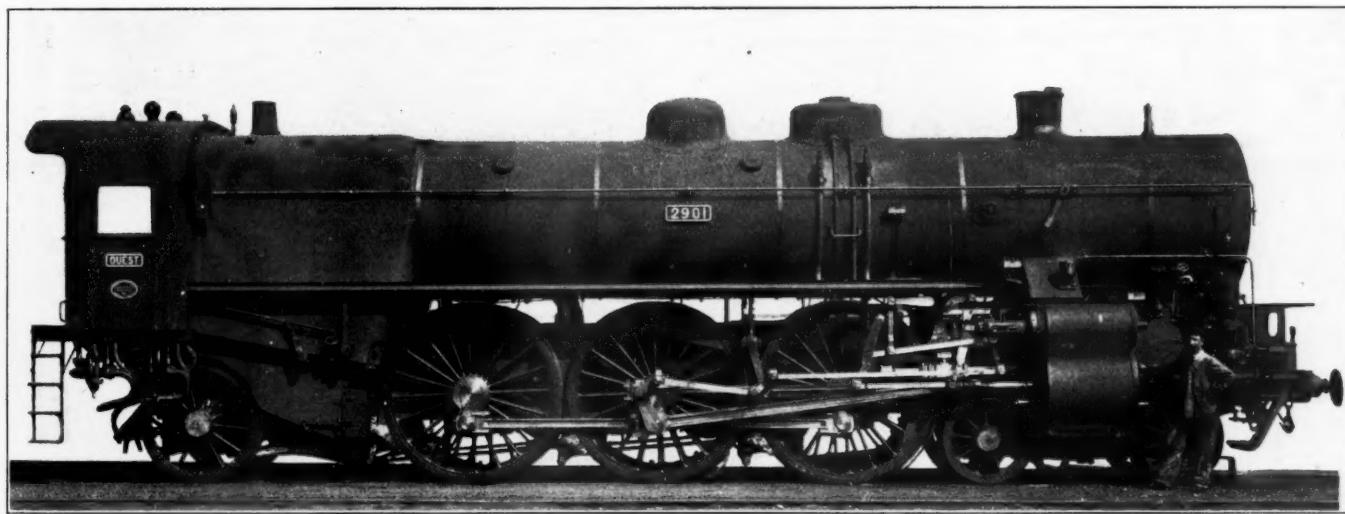
staybolt has a diameter of .98 in. those around the edges of the side and back sheets are 1.10 in. The location of the latter are shown by the hatched circles in the engravings. The stays for the crown sheet instead of being screwed in and pinned or adjusted with turnbuckles, as in American practice, are screwed into both sheets and then held by heavy nuts at each end. The method of staying the back head is also a novelty. Instead of the usual crowfoot and pin connection with a stay sloping up from the point of attachment on the back head to the roof sheet, there is a heavy bolt about 1½ in. diameter, that is enlarged for the threads, which passes through the back head and is fastened to an angle riveted to the shell; the back head being stiffened at the point where the bolts pass by pressed steel channels and angles riveted to the inside. The lower row of these stays that come just above the crown are carried through to the front head, where a jaw and pin connection is made to a stiffening angle in exactly the same way that the work is usually done at the back head of an American boiler. These bars are made adjustable by turnbuckles. The advantage of this arrangement is that all of the stays can be tightened and brought to an even and uniform bearing before the boiler is put under pressure. Whereas, with the crowfoot and pin arrangement there

side doors are controlled independently of each other and of the one at the center.

The firedoor opening is made very large (2 ft. 7½ in. wide) so as to facilitate placing the coal at the sides of the grates. It is closed by two sliding doors that are mounted on guides and can be worked independently of each other.

The throttle valve is of the Zara type, which was illustrated in the *Railroad Gazette* for Dec. 21, 1906. It is operated by a lever that latches in a quadrant on the back head of the boiler, and the stem leads forward to an arm of a bellcrank, where, on the horizontal arm, there are two pins that engage successively in the valve stem, thus decreasing the leverage as the valve opens. The boiler is fed by two Friedmann injectors, both of which are located upon the right-hand side.

According to M. Du Bois, they did not dare adopt the Seive tubes because of the great length, fearing undue expansion if they were used, and it also appeared prudent to give the smooth tubes that are used an inside diameter of 1.97 in., which is considered somewhat large. Then, in order to obtain the number of tubes needed for the required heating surface, the back course of the shell was given a diameter of 64.96 in., with the other courses telescoping to the front so as to reduce the total weight of the engine, a matter that,



Pacific Locomotive for the Western Railway of France.

must be more or less yielding of the sheets before all parts come to a bearing and the stresses are distributed throughout the braces. The firebox is fitted with a fusible plug, a legal requirement.

The tubes are of steel and are expanded in the front sheet, and expanded and beaded in the back sheet with a steel ferrule inside the tube.

In the shell the circumferential seams are double riveted and the longitudinal quadruple riveted. The latter have welt strips inside and out, but the outer strips are narrow and take only the two inner rows of rivets. The shell has a diameter of about 62 in. inside and a thickness of sheet of $\frac{3}{4}$ in., and is intended to carry a steam pressure of 227 lbs. per sq. in. This puts a static load of about 9,570 lbs. per sq. in. on the sheet, which does not vary very much from current American practice.

The firebox is also fitted with a brick arch carried on side brackets and also has a deflector over the firedoor. The grates are rocking with a dump grate at the front end. They are divided into two parts, each working independently of the other. The ashpan is divided into three parts so as to permit the passage of the frames. It is fastened so as to insure not only free access to the air, but a good distribution of it beneath the grate. For this purpose the ashpan has been fitted with three dampers, one for the central portion and the other two in the form of ears for each of the sides. These

under the circumstances, was quite as important as that of its proper distribution.

The cylinders are given a slight inclination (1 in 50). This was necessary in order to get the needed play for the front wheels of the truck in rounding curves; and the outside cylinders have the same inclination in order to drive the valves of the inside cylinders by means of an outside gear.

The fastening of the outside cylinders presented no difficulties. That was not the case, however, with the inside, because of their location in a direct line with the opening cut in the frames for the passage of the front truck wheel. So that fastening them to the frames could not be readily done. It was, therefore, simpler and surer to abandon all direct connection with the frames and fasten them to the front face of the saddle or cross-tie between the two low-pressure cylinders, thus connecting the whole system to this casting. This fastening was further strengthened by the natural method of bolting to the smokebox.

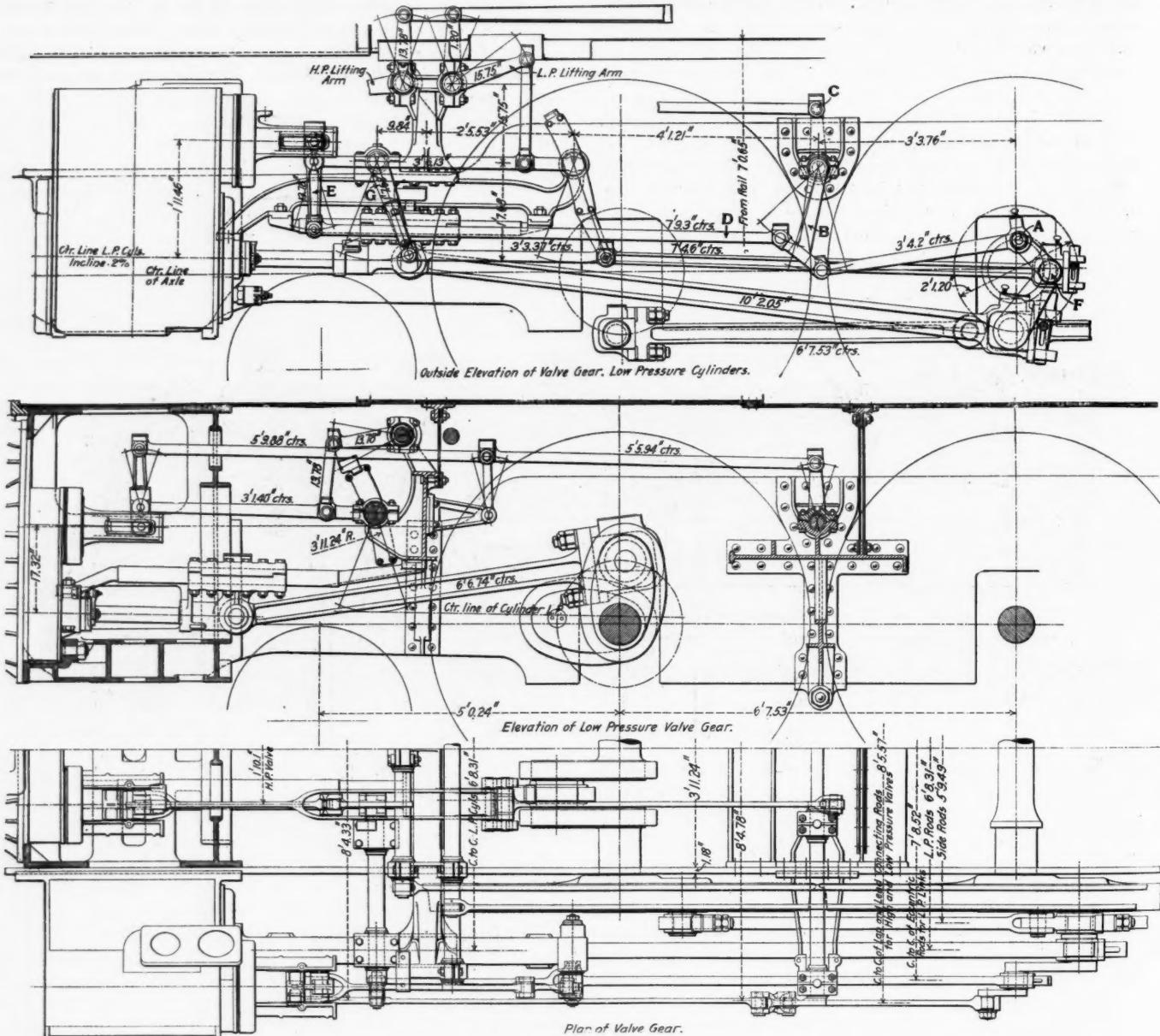
The section of this whole group of cylinders is such that there is nothing to be feared from the overhang, the disadvantages of which are nullified by the connection to the smokebox. It is suggested that this overhang is of common occurrence and is no more apt to cause trouble than that of the outside cylinders in use on all locomotives. Stresses imposed by the steam on the front cylinder heads are resisted by bolts working in tension and therefore under the best conditions.

By grouping the inside cylinders in a single casting it has been possible to form passages common to the two so that the steam is admitted and exhausted from and to the smokebox, each by a single pipe. The exhaust pipe leads to a cast iron reservoir, forming a receiver, from which two pipes lead from the smokebox to the two low-pressure cylinders.

The crowding of the driving wheels so closely together made it exceedingly difficult to obtain a good fastening to the frames for the outside guides, a condition that led to the adoption of a rather unique construction, but one which serves its purpose admirably in connection with the inside cylinders; and by which these inside guides are so located

is forked and fitted with a key and wedge for the adjustment of the brasses. Attention is also called to the very large oil cups on the connecting rods.

Piston valves with inside admission, driven by the Walschaerts valve gear, are used. This is modified in the working of the lap-and-lead lever. The latter instead of being driven direct from the crosshead takes its motion from a special return crank pin. This arrangement was adopted because of lack of space and because of the character of the motion. The usual working of the Walschaerts lap-and-lead lever by the crosshead makes it necessary to use a lever of considerable length because of the stroke of the piston and



Details of Valve Gear.

that they come in the center of the low-pressure cylinder saddle.

All four of these guides are carried by a cast steel cross-tie or guide yoke. The inside guides are bolted directly to it, while those on the outside are supported by an intermediate longitudinal bracket, one end of which is bolted to the cylinders, with the other overhanging about 2 ft. 5½ in. beyond the center of the cross-tie.

The distance between the center of the piston rods and the guides is reduced to a minimum and the crossheads are given a liberal bearing surface. The rods do not differ materially from American practice. Solid ends are used on all pins except for the back end of the low-pressure main rod, which

the minimum distance obtainable between the centers of the valve stem and the radius rod pin. By driving from a special crank pin the throw can be reduced to any point that may be desired, which leaves the designer at liberty to decide upon the length of the lever as well as the distance between the two centers referred to.

Referring to the assembled drawing of the gear it will be seen that there is a double return crank on the main crankpin. This return crank carries two pins: one at 90 deg. from the main crank for driving the link in the usual manner and the other directly opposite the main crank, but with a much shorter stroke for driving the lap-and-lead lever. The connection from this last crank leads directly from the pin

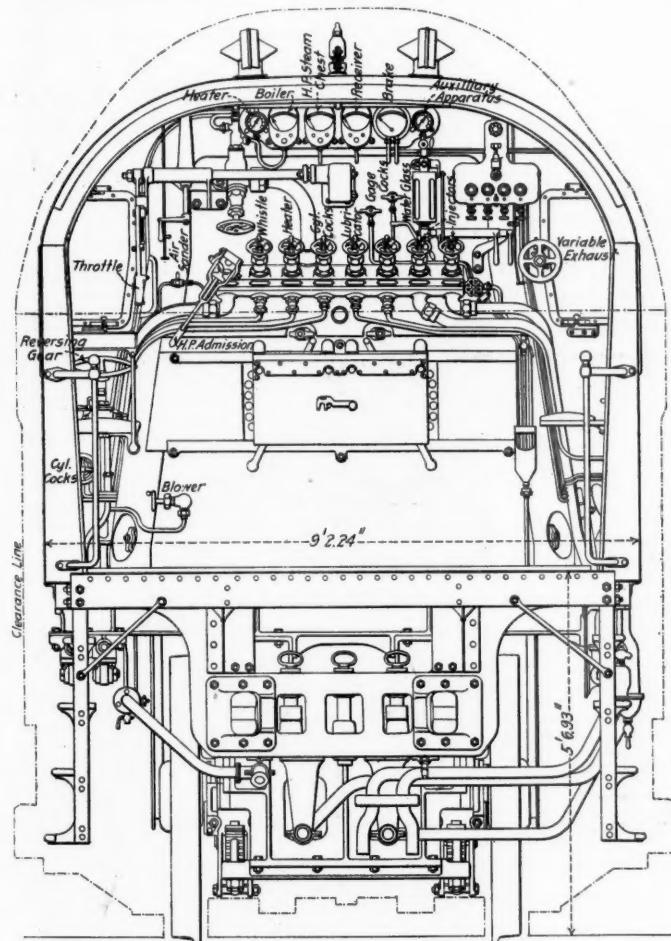
A to a pin on the lower end of a rocker B. This pin is directly opposite that on the rocker C keyed to the same shaft, so that the lower end of B and the upper end of C move in opposite directions, to correspond to their respective cranks of the low and high-pressure cylinders, which are 180 deg. apart. From B the transmission rod D leads forward to the lap-and-lead lever E of the low-pressure cylinder, and from C a similar rod goes to the lever of the high-pressure piston.

From the regular valve crank at F, the eccentric rod runs direct to the heel of the low-pressure link, and from there a transmission bar connects with the rocker G, keyed to a shaft that forms a trunnion of the high-pressure link. With this arrangement the radius rod of the low-pressure valve is raised and that of the high-pressure lowered for forward motion, both valves being outside admission.

The reason for the variation in the point of attachment

previously used upon the road, and is a very simple Corliss arrangement. The exhaust from the high-pressure cylinders is discharged directly into the cylindrical cavity shown between the steam chests. From this there are two passages leading, one to the direct exhaust and the other to the receiver. The entrances to these passages are closed by Corliss valves set at right angles to each other, so that when one opening is closed the other is wide open. The valves are held to their faces by light springs and are operated by a small cylinder bolted to the side of the smokebox and acting through a series of levers and connections as shown. It is under the control of the driver and is operated by compressed air.

In this connection attention is called to the very peculiar arrangement of the smokebox. The great length of this part would strike the observer at once. It is 6 ft. 7.41 in. from the center of the stack to the front face of the smokebox ring,



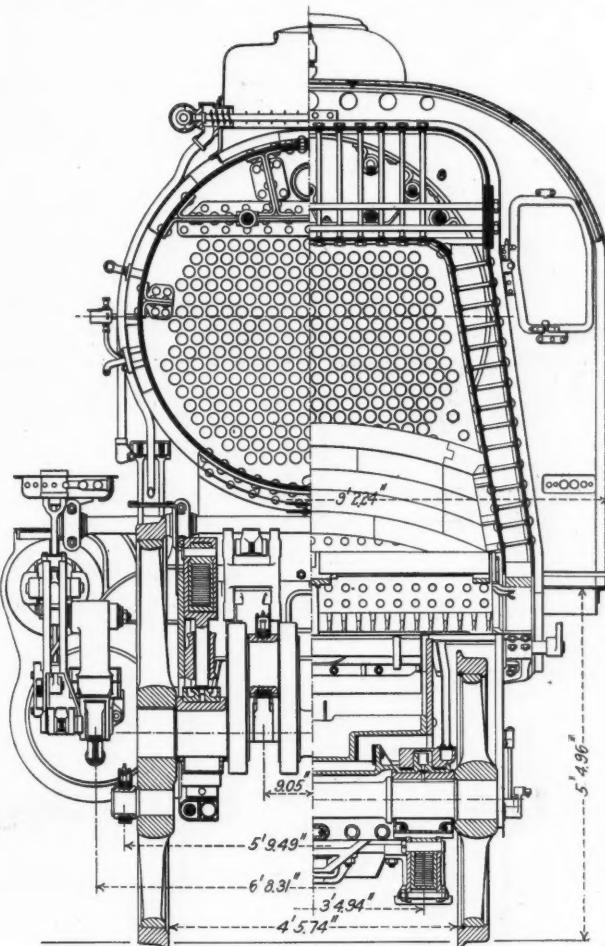
Rear Elevation.

of the eccentric rod and transmission rod at the lower end of the rocker B is that the perturbations due to the angularity of the connecting rods are thereby annulled.

The lifting shafts of the high and low-pressure motions are operated independently and are both carried by the cross-tie that supports the guides. This cross-tie is also used as a bracket for the high-pressure link, and incidentally serves as a boiler support and a frame brace, so that it plays a very important part in the construction of the machine. There is an advantage in this grouping of as large a number of parts as possible upon this single casting in that it not only reduces the machine work required but insures the proper assembling of these interrelated pieces.

With this valve motion the steam distribution is such that the cut-off can be delayed to 90 per cent. of the stroke, for running in either direction, which is considered to be of an advantage when switching or running with a closed throttle.

The starting valve for these engines is the same as that



Half Sections in Front of Cylinders and Through Firebox.

and the stack is 3 ft. 6.13 in. ahead of the tubesheet, so that the total inside length of the smokebox is 10 ft. 1.54 in. This is greater than the longest of even the old extension fronts that came in and passed away on American roads during the eighties.

The internal arrangements of the smokebox are exceedingly simple and contrast, in that respect, very favorably with American practice.

The dry pipe has a somewhat different connection at the front tubesheet, though the ball-and-socket rings are used. But the hole is somewhat enlarged and the joint is made by a brass collar on the pipe and sets in from the outside. Owing to the great thickness of the tubesheet (.98 in.) there is no need for the American stiffening ring and none is used. The piping is simplified by the use of a single steam pipe for the two high-pressure cylinders and a single emergency and exhaust to the receiver. The receiver is a cast cylindrical tank 11.81 in. in diameter and 4 ft. 9.88 in. long. It is car-

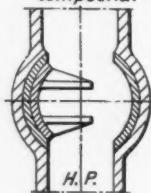
ried against the top of the smokebox at the front end, and has a flanged opening projecting out through the sheet to which a safety valve is attached. There is no diaphragm and the netting is formed of a grating of round bars surrounding the exhaust pipe and attached to the bottom of the flare of the inside stack. The nozzle is variable and under the control of the driver. It is difficult to understand how such an exceedingly simple device can produce an even draft on the fire and uniformly distributed currents through the tubes when American engineers find their arrangement of diaphragm, netting and petticoat pipes all essential to the securing of satisfactory results.

In the spring suspension there is an equalization between all of the driving wheels and the rear trucks and the springs

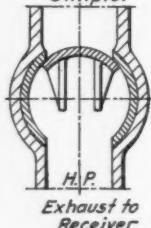
serving as a support for the front end of the firebox, and a deck plate that carries the back end of the firebox and the cab and to which the tender drawbar is attached. Between these last two braces the frames are stiffened by a double thickness. All of these crossties are of cast steel.

The shell of the boiler is fastened to the several crossties with buckle and expansion plates. The foundation ring of the firebox is of cast steel and rests at the front and back on expansion shoes, and is also held down by clips. This will be recognized as being quite in accordance with American practice, whereby the relative positions of the boiler and the frames are maintained constant, while provision is made for a perfectly free expansion, at the same time insuring great vertical and transverse rigidity. This is shown by the fact

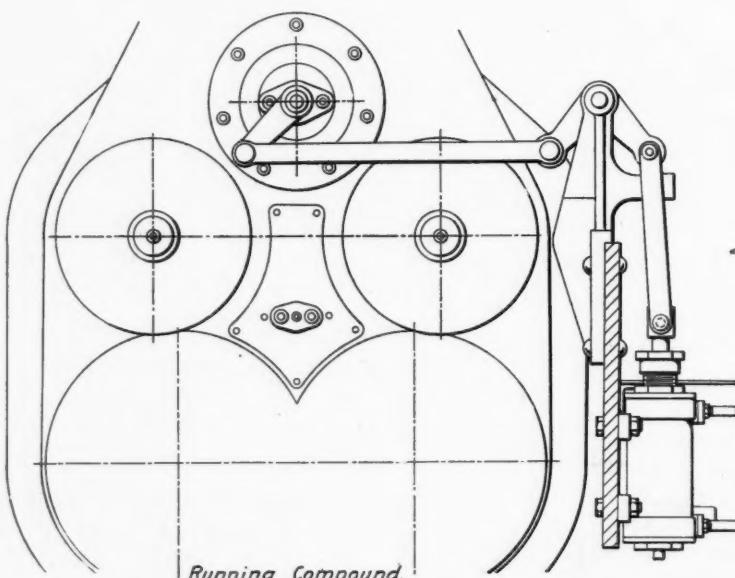
Position for Running Compound.



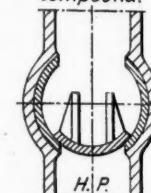
Position for Running Simple.



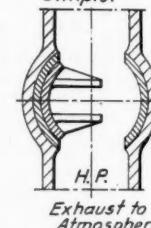
Exhaust to Receiver.



Position for Running Compound.

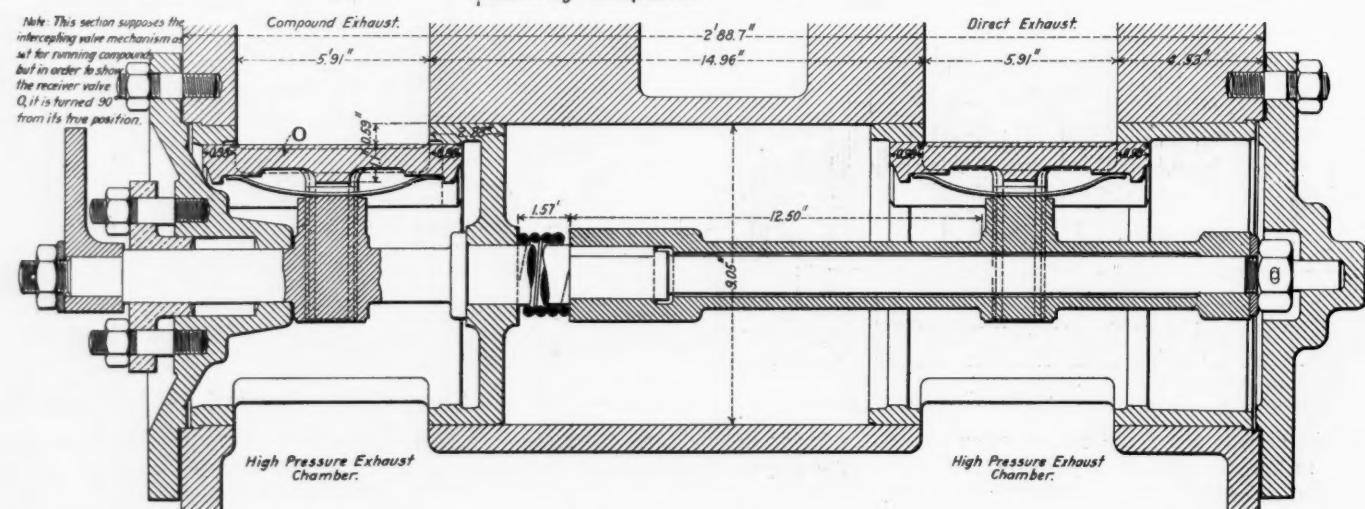


Position for Running Simple.



Exhaust to Atmosphere

Note: This section supposes the intercepting valve mechanism set for running compounds, but in order to show the receiver valve Q, it is turned 90° from its true position.



Intercepting Valve.

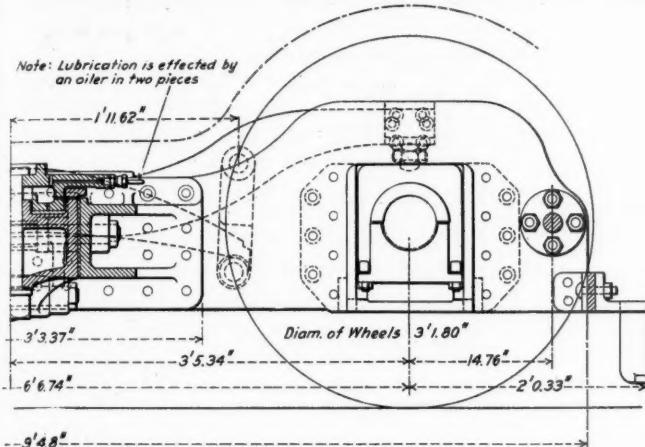
are put over the boxes. Although it may be desirable from the standpoint of the stresses imposed on the track and for the sake of facilitating the transverse oscillations of the suspended mass of the machine to use an underneath suspension, it was thought to be preferable, in order to avoid excessive oscillations due to the height of the boiler, to place the springs above the boxes.

The frames are of the plate class used in France, and are well braced and tied together. These braces are: The front bumper; the low-pressure cylinder saddle, which also carries the high-pressure, besides providing a center plate for the front truck; the guide yoke; an intermediate boiler brace, also utilized for attaching the brake cylinder; a box casting,

that when wheeling the engine it is lifted by the two ends, and yet no perceptible opening of the bottom of the pedestal jaws could be detected.

In probably no detail of the locomotive is the difference in the elaboration of detail between the French and the American practice more marked than in the trucks. The use of the bogie truck in France is of comparatively recent date, and in its construction there is a refinement unknown in America. In the case in hand, following the lead of the locomotive itself, plate frames are used, and these are held by a very substantial transom riveted in place. The center plate is carried by short swing hangers 6.3 in. long, hung vertically. The spring arrangement is that of American practice and not

that of the semi-elliptic at the axle boxes, which was copied from their car construction and used on the early bogie trucks in France. In the center plate the faces are finished and a brass washer is used between the parts. Brass bushings are also used for bearings for the center plate hanger pins, a refinement that would not be dreamed of in the United States.



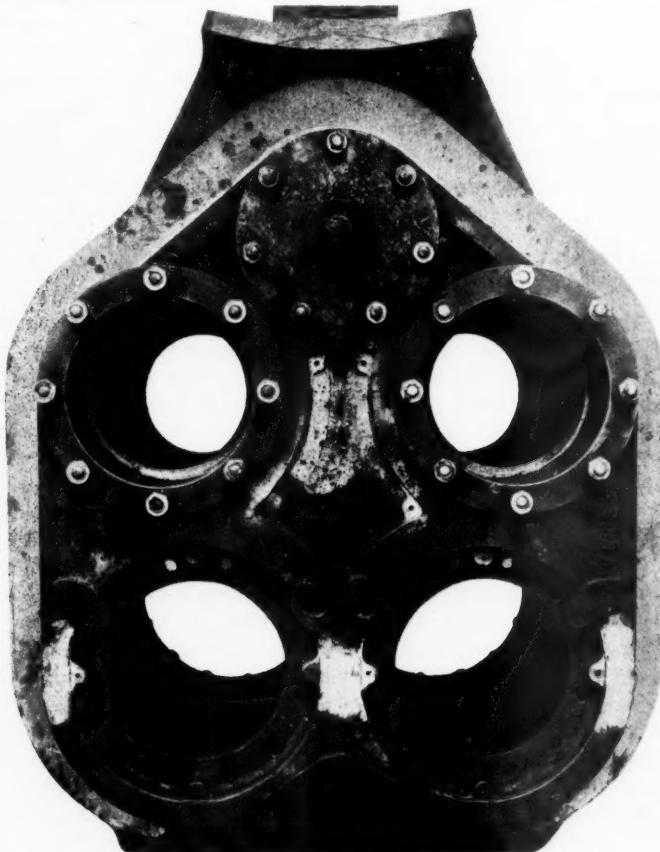
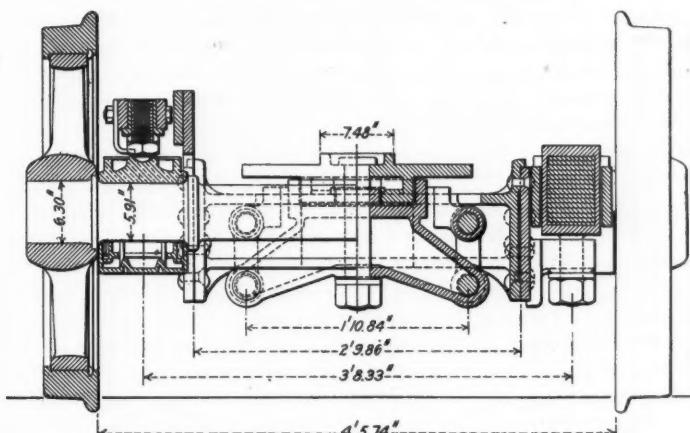
Details of Leading Truck.

So, at the ends of the frames, the end piece carrying the wheel guard is bolted to angles, but the cross brace is a bar 1.97 in. in diameter with a foot jumped or welded on and bolted to the plates. These points are merely characteristic of the elaboration of the whole.

The location of the rear truck beneath the smokebox of a

The truck is formed of a frame that surrounds the axle and rests upon the two seats of the boxes. The radius bar, a steel casting, is bolted to one side of this frame and the pin hole in this is fitted with a brass bushing.

The truck is loaded on either side as follows: At each end of the frame there is a pocket in which a yoke is fitted and

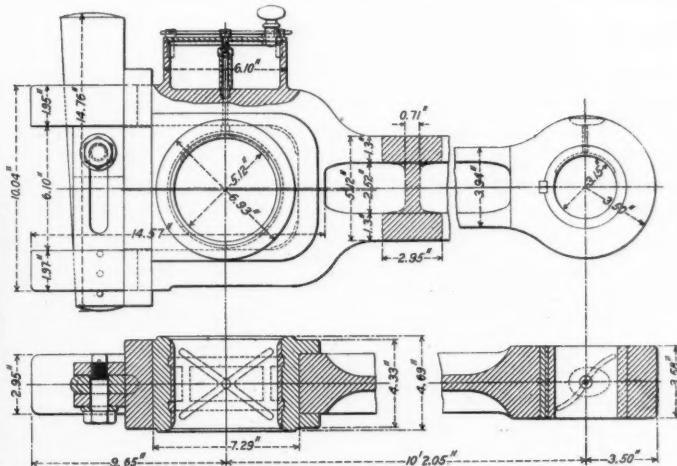


Cylinder Casting.

Pacific locomotive makes it necessary to give it considerable lateral play, and this has been obtained by the use of various forms of radial trucks. In this case a regular Bissel or pony truck is used. Its position under the ashpan and the equalizing of its springs with those of the driving wheels has made it necessary to use a design that was very compact.

can turn. At the ends of this yoke there are two short hangers which support a piece of cast steel which passes around and beneath the axle and its box. This piece is held in place by two pedestal legs of the main engine frame so that it is held parallel to them. It is loaded at the bottom by a semi-elliptic spring, which is, itself, loaded at each end by hangers, one of which is attached to the rear equalizer and the other to the back end of the engine frame.

This arrangement maintains a constant distribution of the load and yet permits of the displacement of the truck in every direction; it is, in fact, a suspension in gimbels, so that it can swing about the three pivots at right angles to each other, namely, that of the yoke, the hangers and the spring



Plan and Elevation of Low Pressure Connecting Rod.

hangers. This takes care of the vertical deflection of the spring and the angularity of the equalizers, the longitudinal displacement due to the angularity of the spring hangers and the transverse displacement which is taken care of by the main hangers.

Incidentally any twisting due to the yoke hangers is avoided by holding it by a cast steel guide, and the stability of the latter is obtained by guiding it, relatively to the frame, by an extension of the lower ends of the hangers. The side motion of truck is limited to 2.76 in. by stops. The hangers are of such a length (6.69 in.) that before the stops are reached there is a thrust of one-third the weight tending to draw it back to the center. Still both the pony and bogie trucks have

latitude of motion sufficient so that they can take up any inequalities in the track without reacting upon the engine, features that are of equal importance to that of gradually increasing the resistance to side motion as the truck enters a curve and its tendency to straighten as it runs out on a tangent. In fact, the engine is perfectly stable upon a straight line at all speeds and enters a curve without the slightest shock. It is capable of passing a curve of 440 ft.

The cab, which has a width of 9 ft. 2.24 in., is as wide as the clearances will permit, and, in spite of that the boiler fills the greater portion of it. A view ahead is only possible along each side of the boiler and the windows are quite small.

Reversing is of the regulation type, that is, by means of a handwheel and screw, the location of which in the cab was impossible because of the limited space available. The wheel was, therefore, placed at the upper end of an inclined shaft like the steering wheel of an automobile. This turns two side screws that are located beneath the foot plate and parallel to the frames. Nuts on these screws carry the end of the reach rod back and forth to the desired point of cut-off. The cylinder cocks are operated by a cylinder with two pistons of different diameters. By admitting air to one or the other of the opposite faces of these pistons the connection can be held in any one of three positions.

The driving brake rigging is based on the same principle as that of the ordinary pull brake used on American locomotives, but is worked out with a considerably greater elaboration of detail. The cylinders are set between the frames in front of the forward driving wheel, the short bell crank transmits the multiplied pull to the equalizer that is pivoted on the lower end of the brake lever and hanger which also forms the brake head. This rigging is between the wheels, and as the levers are set vertically instead of horizontally they must be fitted at the connections in order to be held in place. The brakeshoe is pivoted to the lever and head so that it may adapt itself to the position of the wheel, and is prevented from tilting by a spring whose tension is adjusted by a set screw. The arrangement at the middle wheel is a duplication of the first while at the rear there is simply a lever or hanger and shoe.

The rear view of the engine shows the cab to be very thoroughly equipped with gages, valves and attachments. These nearly cover the back end of the boiler and that a comparison may be made with American cabs the names of the several parts are indicated on the engraving.

The following are some of the principal dimensions of these engines:

Tractive effort	27,874 lbs.
Cylinder, diameter, h. p.	15.75 in.
Cylinder, diameter, l. p.	26.00 "
Piston stroke	25.20 "
Steam pressure	.227 lbs.
Firebox: Length (inside) at bottom	7 ft. 3.8 in.
" Width (inside) at top	4 " 3.18 "
" Width (inside) at bottom	5 " 10.87 "
" Height above grate at front	6 " 0.84 "
" Height above grate at back	4 " 9.1 "
Wheels, diameter, drivers	76.38 "
" trailing	51.57 "
" front truck	37.80 "
Tubes, diameter (outside)	.217 in.
" length	19 ft. 6.85 "
" number	283
Heating surface, firebox	150.10 sq. ft.
" tubes	2,894.52 "
" total	3,044.62 "
Grate area	43.04 "
Volume of water space	292.82 cu. ft.
Volume of steam space	123.48 "
Weight of engine, empty	180,400 lbs.
" of engine in working order	199,540 "
" on front truck	49,060 "
" on driving wheels	117,810 "
" on rear truck	32,670 "
Wheel base, total	34 ft. 8.14 in.
Tank capacity, water	6,333 gals.
Tank capacity, coal	.9 tons.
Tender weight, empty	52,800 lbs.
Tender weight, in working order	125,400 "

Weight on drivers	= 4.22
Tractive effort	
Total weight	= 7.16
Tractive effort	

Weight on drivers	= 54.04*
Total weight	
Tractive effort x diameter drivers	= 699.23
Heating surface	
Heating surface	= 70.73
Grate area	
Firebox heating surface	= 4.93*
Total heating surface	
Weight on drivers	= 38.69
Total heating surface	
Displacement 2 h. p. cylinders, cu. ft.	= 5.86
Total heating surface	
Displacement 2 h.p. cylinders	= 51.95
Grate area	
Displacement 2 h.p. cylinders	= 7.34

*Per cent.

NEW YORK TUNNEL EXTENSION OF THE PENNSYLVANIA RAILROAD; EAST RIVER DIVISION.*

BY ALFRED NOBLE, PAST-PRESIDENT, AM. SOC. C. E.

[WITH AN INSERT.]

A general outline of the work included in this division has been given by General Raymond in the first paper of the series. The following is intended only as a note to connect his paper with the more detailed descriptions of the execution of the work which will follow.

Soon after the company's project was made public, in the latter part of 1901, borings were begun in the East river, and a few weeks later in Manhattan and Long Island City. A preliminary base line was measured on the Manhattan side, and temporary transit stations were established on buildings from which all borings in the river were located. The river borings were all wash-borings made from a pile-driver boat. After the results were plotted on the map, contour lines were drawn to indicate the rock surface, and profiles along the tunnel lines were plotted from the contours; as the borings were preliminary to the final location of the tunnels, and in many cases at some distance from the tunnel lines, considerable divergence from the actual rock surface was expected, and realized in a few places, yet on the whole the agreement was very good. The borings revealed two depressions or channels where the rock surface passed below the grade of the projected tunnels, these depressions being separated by a rock reef which extends down stream from Blackwell's island. In Thirty-second and Thirty-third streets in Manhattan, borings were made from the river to the station site at intervals of about 100 ft., wash-borings and core-borings alternating. In Long Island City, where the tunnel lines were to pass diagonally under the passenger station building and passenger yard of the Long Island Railroad and under streets and private property, the arrangement of borings was less regular, although the alternation of wash-borings and core-borings was carried out as far as practicable. After the final location of the work, additional borings were made, particularly on shaft sites and also along the approaches and in the Sunnyside Yard, Long Island City.

A triangulation was carried across the river with a measured base on each side. It was impossible to measure directly between the extremities of either base. The bases were measured with 100-ft. steel tapes, supported every 20 ft., stretched with a uniform pull, and frequently compared with standardized tapes. On account of the crowded condition of the streets

*From a paper published in the *Proceedings of the American Society of Civil Engineers* for September, 1909, page 888.

during the hours of daylight and evening, most of the work was done between 10 p. m. and 5 a. m. Similar measurements were made in the streets along the tunnel lines. Angle readings were repeated many times, as is usual in such work.

Levels were first transmitted across the river by simultaneous observations of the river surface; then by several repetitions, across Blackwell's island and the narrow channels on each side, where the longest sights were about 1,100 ft.; and, finally, by several lines through the tunnel of the East River Gas Company, at Seventy-first street.

The work of the East River division at the station site embraced the excavation to the depth necessary for tracks, and the building of a retaining wall extending in Thirty-first street from the east side of Ninth avenue to the west side of Seventh avenue, thence northward along seventh avenue for 155.5 ft.; also a retaining wall in Thirty-third street from the west side of Seventh avenue to the east side of Ninth avenue, and thence southward along Ninth avenue for 136.3 ft. This work was carried out under the direction of George C. Clarke, M. Am. Soc. C. E., as resident engineer, by whom it will be described in detail.

The station tracks leading eastward from the station will converge under Seventh avenue and for some distance farther east, and pass into two three-track tunnels, one under Thirty-second street and the other under Thirty-third street, at the respective distances of 192 and 402 ft. from Seventh avenue. A typical cross-section of the three-track tunnel is shown herewith. The converging sections were considered as easterly extensions of the station, and were not included in the East river division. Within a few hundred feet the tracks are reduced to two, each passing into a single tube, the two tunnels under each street being formed in one excavation, the distance between center lines of tunnels being 20 ft. 4 in. This construction has been termed a twin tunnel, and a typical cross-section is shown. The tunnels continue on tangents under the streets to Second avenue, where they curve to the left by 1 deg. 30-min. curves, passing under private property, gradually diverging and passing through shafts just east of First avenue. About 350 ft. west of the shaft, the divergence of the two lines from each street becomes sufficient to leave a rock dividing wall between them, and thence eastward each tunnel is formed in a separate excavation. A typical cross-section of the two separated tunnels is shown.

It thus appears that eastward from the station the lines constitute a four-track road, each track being in a separate tunnel; for convenience of the work these lines were designated A, B, C, and D, from north to south.

Charles L. Harrison, M. Am. Soc. C. E., was appointed principal assistant engineer. He was directly in charge of all parts of the work, and all resident engineers reported to him. George Leighton, M. Am. Soc. C. E., was placed in charge as resident engineer of the Thirty-third street lines from the west end of the three-track tunnel to the shaft and also eastward from the shaft under East river. As he was not then able to endure the effects of compressed air, the work under the river was transferred to James H. Brace, M. Am. Soc. C. E., as resident engineer. Before the completion of the land tunnels under Thirty-third street, Mr. Leighton accepted more responsible employment elsewhere, and Mr. Brace assumed charge of them also. Francis Mason, M. Am. Soc. C. E., was in charge as resident engineer of the Thirty-second street lines during their entire construction, and also of the tunnels extending these lines eastward from the First avenue shaft under the river.

The plans for the Thirty-second and Thirty-third street lines provided for three-track tunnels from the west end of the work under the contract eastward 1,628 ft. in Thirty-second street and 1,418 ft. in Thirty-third street to the west line of Fifth avenue, with a descending grade of 0.4 per cent.; this was to constitute, in a degree, an extension of the station, where trains could stand without brakes while awaiting signals to proceed to or from the station. From Fifth avenue

eastward to the lowest point under the river, the grade was to be 1.5 per cent. on all lines. Later, during construction, when excavating westward under Thirty-third street from Fifth avenue, the surface of the rock was broken through, disclosing quicksand; within the next few days trial drill holes through the tunnel roof at Thirty-second street and Fifth avenue showed a thin cover with quicksand above it. The conditions had been indicated in a general way by borings made before construction was begun, but they proved to be rather worse than anticipated. On a topographical map of Manhattan island, made by General Egbert L. Viele in 1865, is shown a watercourse which had its source near what is now Broadway and Forty-fourth street, flowing thence along the west side and south end of Murray Hill, passing under the present site of the Waldorf-Astoria Hotel, crossing Thirty-third street at the point where the rock surface was broken through in the tunnel excavation, as above stated, crossing Thirty-second street at its intersection with Fifth avenue, where trial drilling showed thin rock cover over the tunnel excavation, passing thence eastward a short distance south of Thirty-second street, which it recrossed near Third avenue, and finally discharging into the East river near Thirty-fourth street, and a little west of the present First avenue. The ancient creek apparently followed the course of a valley in the rock, the valley having become filled to a considerable depth with very fine quicksand.

The unfavorable conditions developed at Fifth avenue affected both the construction of the tunnels and the maintenance of adjacent buildings. It would be necessary to construct the tunnels in open cut for a large part of the way westward, causing serious inconvenience to the public; the buildings were mostly of the older class, founded in earth, but there were several modern high buildings with foundations in the same material; some of these had been built since the tunnels were planned. In view of these added risks and the increased cost of construction, the value of the three-track construction was reconsidered, and two important changes were made in the plans. The first of these was to continue the twin tunnel westward to Sixth avenue in Thirty-second street, and to a point 180 ft. west of Sixth avenue in Thirty-third street; the twin tunnel being 9½ ft. less in height than the three-track tunnel and 9 ft. narrower, the change reduced the difficulties considerably. Where the three-track tunnel was thus eliminated, there was no longer objection to a steeper grade, so that, going eastward from the station, a grade of 0.8 per cent. in Thirty-third street and 0.9 per cent. in Thirty-second street was substituted for the original 0.4 per cent. grade. From the west line of Fifth avenue eastward short sections with descending grades of 0.3 per cent. connect with the original 1.5 per cent. grade near Madison avenue. The effect of these two changes—type of tunnel and grade—was to lower the roof of the tunnels at Fifth avenue about 15 ft., which made it practicable to avoid open cutting east of Sixth avenue.

A full account of the construction of the cross-town tunnels will be given by the resident engineers.

As already stated, the grade of 1.5 per cent. from Fifth avenue eastward was fixed with reference to the lowest point of the river bed in order to give the requisite cover over the tunnels at the deepest point of the channel on the west side of the reef, where the river bottom was about 60 ft. below mean high tide for a short distance. On the other hand, as the use of compressed air in building the tunnels was anticipated, an excessive depth below the water surface was to be avoided as far as possible; it was necessary, however, to continue the descending grade some further distance until the tunnels were mostly in rock, so that drainage sumps under the tunnels could be made readily. Eastward from the sumps the tunnels had a rising grade of 0.7 per cent. to the established bulkhead line on the Long Island side, giving a cover at the points where the tunnels enter rock, a short distance westward, of

about 10 ft. (if the dredging plane should be fixed at some future time at 40 ft. below mean low tide, as may be reasonably anticipated). Eastward from the bulkhead line, tunnels A, B and D have ascending grades of about 1.25 per cent., while tunnel C rises at the rate of 1.9 per cent. in order to effect a crossing over tunnel B west of the portals. This feature was introduced in order to place the two westbound tracks together through the Sunnyside yard, and the heavier grade, being downward with the traffic, was not objectionable.

The arrangement of grades and tracks in the approaches and in Sunnyside yard would require the introduction of too much detail to be taken up here, but will be dealt with in the paper on the Sunnyside yard.

It was recognized from the inception of the project that the tunnels under the East river would be the most difficult and expensive section of the East river division. The borings had shown a great variety of materials to be passed through, embracing quicksand, coarse sand, gravel, boulders, and bed-rock, as well as some clayey materials. [See inset.] The rock was usually covered by a few feet of sand, gravel, and boulders intermixed, but, in some places, where the rock surface was at some distance below the tunnel grade, the material met in tunneling was all quicksand; the nearest parallels in work previously done were some of the tunnels under the Thames, particularly the Blackwall tunnel, where open gravel was passed through. Before the plans for the East river tunnels were completed, work had been resumed, after many years' interruption, in the old Hudson river tunnels between Fifteenth street, Jersey City, and Morton street, Manhattan, and sand materials were passed through for a short distance. These experiences satisfied nearly all the engineers in any way connected with the work that the shield method was the most suitable for the East river tunnels, and the plans for the work were based on its adoption. Other methods were advocated, particularly caisson constructions and the freezing process, the latter being urged very strongly, and, when proposals were invited, in October, 1903, bidders were informed that alternative methods would be taken into consideration.

Only one bidder proposed to carry out the work on the basis of unit prices, but the prices were so low that the acceptance of the proposal was deemed inadmissible; no bid based on caisson methods was received; several offers were made to perform the work by the shield method, in accordance with the plans, for a percentage of its cost, and one was submitted, on a similar basis, covering the use of the freezing method. The firm of S. Pearson & Son, Ltd., London, England, submitted a proposal for building the tunnels by the shield method, on a modification of the percentage basis, and as this firm had built the Blackwall tunnel within the estimates of cost and was the only bidder having such an experience and record in work in any way similar to the East river tunnels, negotiations were continued between that firm and the railway company.

The contract embraced the permanent shafts in Manhattan and Long Island City, the tunnels between these shafts, and their extension eastward in Long Island City to East avenue, including in all about 23,600 ft. of single-track tunnels. The contract had novel features, and seemed to be peculiarly suitable for the unknown risks and the unusual magnitude of the work. A fixed amount was named as contractor's profit. If the actual cost of the work when completed, including this sum named as contractor's profit, should be less than a certain estimated amount named in the contract, the contractor should have one-half of the saving. If, on the other hand, the actual cost of the completed work, including the fixed sum for contractor's profit, should exceed the estimated cost named in the contract, the contractor should pay one-half the excess and the railway company the other half; the contractor's liability was limited, however, to the amount named for profit plus \$1,000,000; or, in other words, his maximum money loss would be \$1,000,000. Any further excess of cost was to be borne wholly

by the railway company. The management of the work, with some unimportant restrictions, was placed with the contractor; the relations of the engineer, as to plans, inspection, etc., were the same as in ordinary work, and the interest of the contractor to reduce cost was the same in kind as in ordinary work.

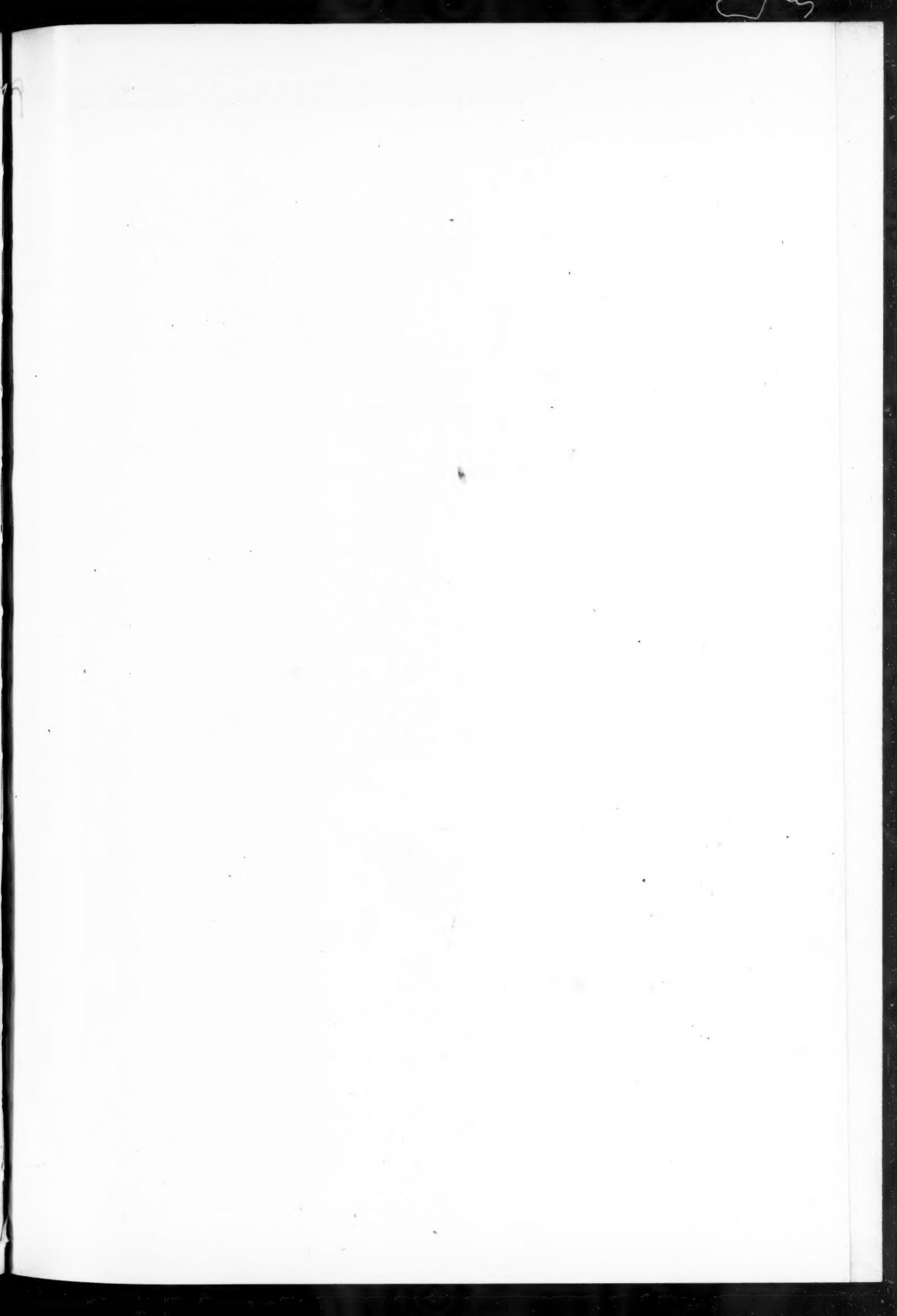
On account of the extent of the work embraced in this contract, and the dangerous exposure to compressed air required in most of it, it was divided into three residencies; two of these, including also the cross-town tunnels, have been described; the third, with S. H. Woodard, M. Am. Soc. C. E., as resident engineer, embraced all tunnels from the easterly end of the work near East avenue in Long Island City to the meeting points under the river and also the permanent shafts in Long Island City. The execution of the work under this contract will be described fully by the resident engineers.

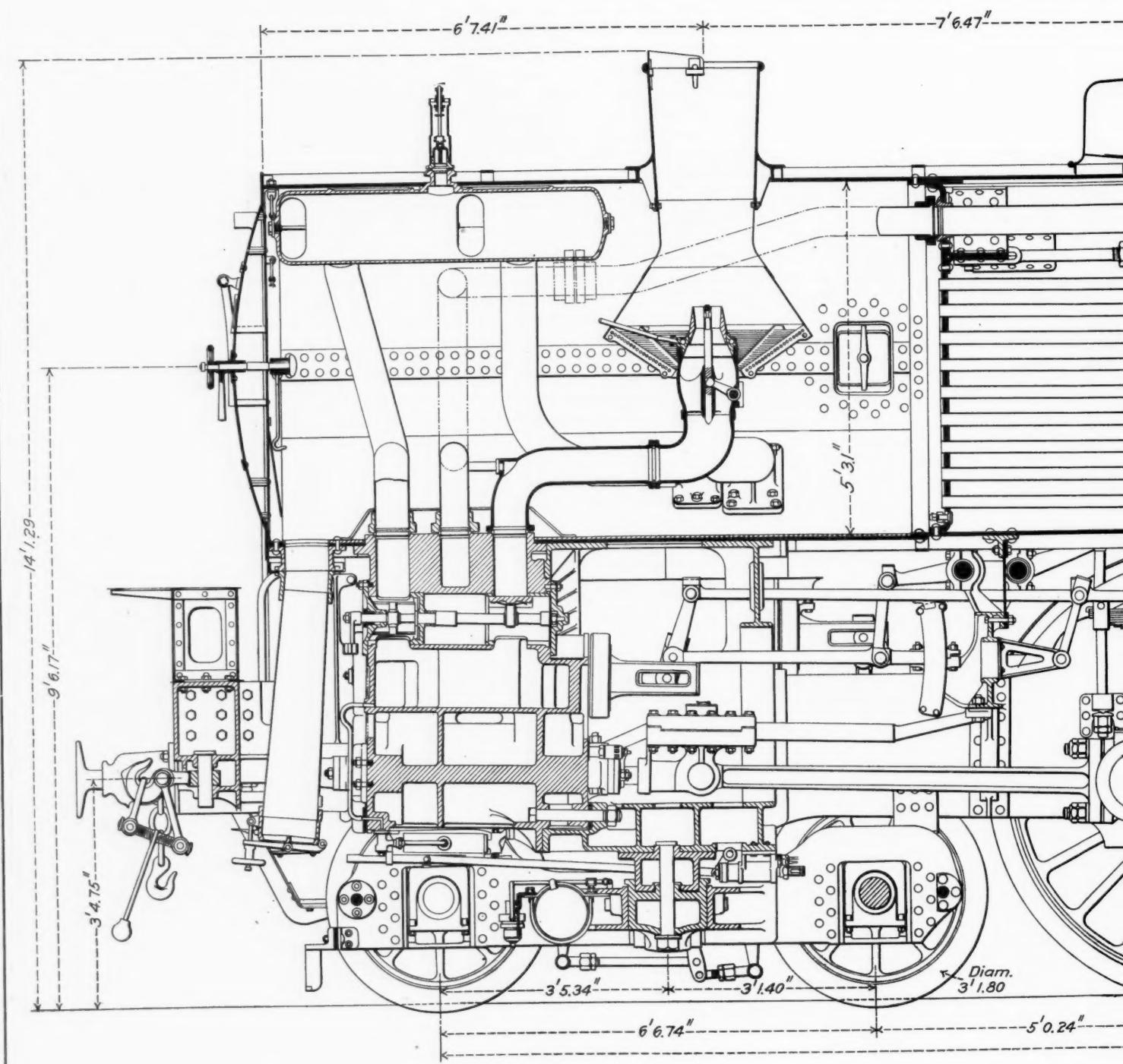
The plant assembled by the contractors is believed to be the most extensive ever placed on a single piece of work, and will be described in detail by their managing engineer, Henry Japp, M. Am. Soc. C. E.

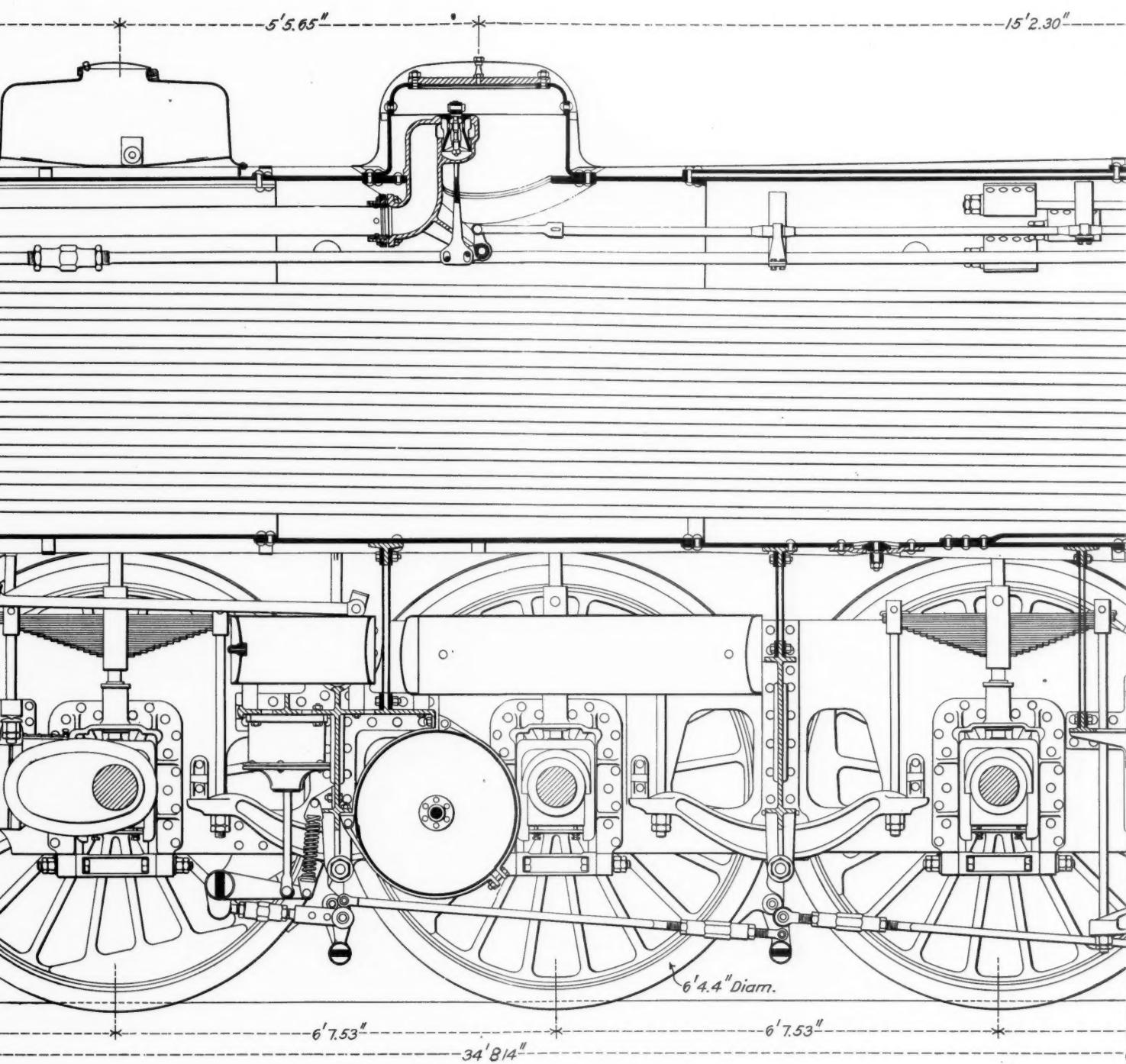
For convenience in receiving materials to be used in construction, and to facilitate the disposal of excavated materials, one pier was leased on the east side of the Hudson river, two on the west side of the East river, and three on the east side. Excavated materials from the station, the cross-town tunnels, and the river tunnels were placed on barges furnished by Henry Steers under several contracts embracing also the disposal of the materials. In the earlier part of the work, they were used as fill in the freight terminal of the Pennsylvania Railroad at Greenville on the west side of the upper bay; when the fill at this place was completed, the materials were sent to the tunnel company's yard on the Passaic, at Harrison, N. J., and a small part to the embankment in the Meadow division. On account of the occasional closing of the Passaic by ice, this involved the possibility of, and to some extent resulted in, interruptions to the work of excavation. The contract for the cross-town tunnels carried an option in favor of the company to require the contractor for those tunnels to dispose of materials at a stated price, and in the latter part of 1907, when the excavation in these tunnels was being pushed rapidly, the railway company, unwilling to incur the responsibility for delays during the winter, availed itself of this option. The disposal of materials was an important part of the work, and will be dealt with more fully by the resident engineers.

At the time the contract was made with S. Pearson & Son, it had not been determined whether mechanical ventilation would be provided for the tunnels, and therefore the contract with that firm did not include the final concrete lining at the shafts, above the invert of the tunnels. After the adoption of plans for mechanical ventilation, in the latter part of 1908, the plans for lining the shafts with concrete, including flues for conducting air to the tunnels, and stairways for ingress and egress, were completed, and the work was placed under contract; it will be described in detail by F. M. Green, Assoc. M. Am. Soc. C. E.

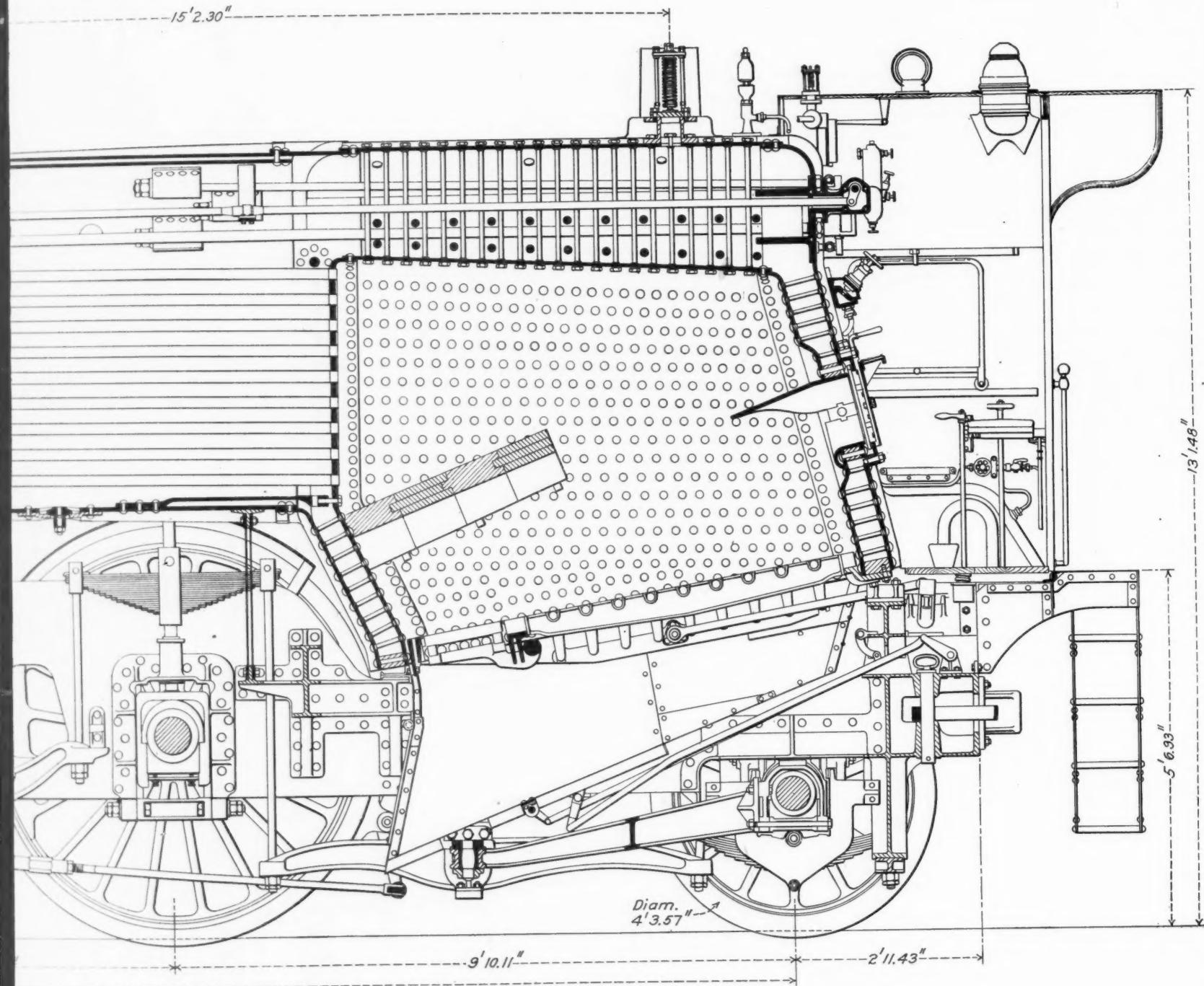
For convenience in placing the work under contract, a line was drawn 10 ft. west of Thomson avenue, dividing the work east of that line in the Pearson contract into two parts. The work west of the line was placed under the immediate direction of George C. Clarke, M. Am. Soc. of C. E., as resident engineer, with the Naughton Company, and Arthur McMullen, contractors; Louis H. Barker was resident engineer of the part east of the dividing line, with the Degnon Realty & Terminal Improvement Co. as the principal contractors. The substructures of the several bridges in or across the yard were included in these contracts, but the superstructures were carried out by various bridge companies, and other minor features were executed by other contractors. More complete descriptions of the plans and of the execution of the work will be given by the resident engineers.



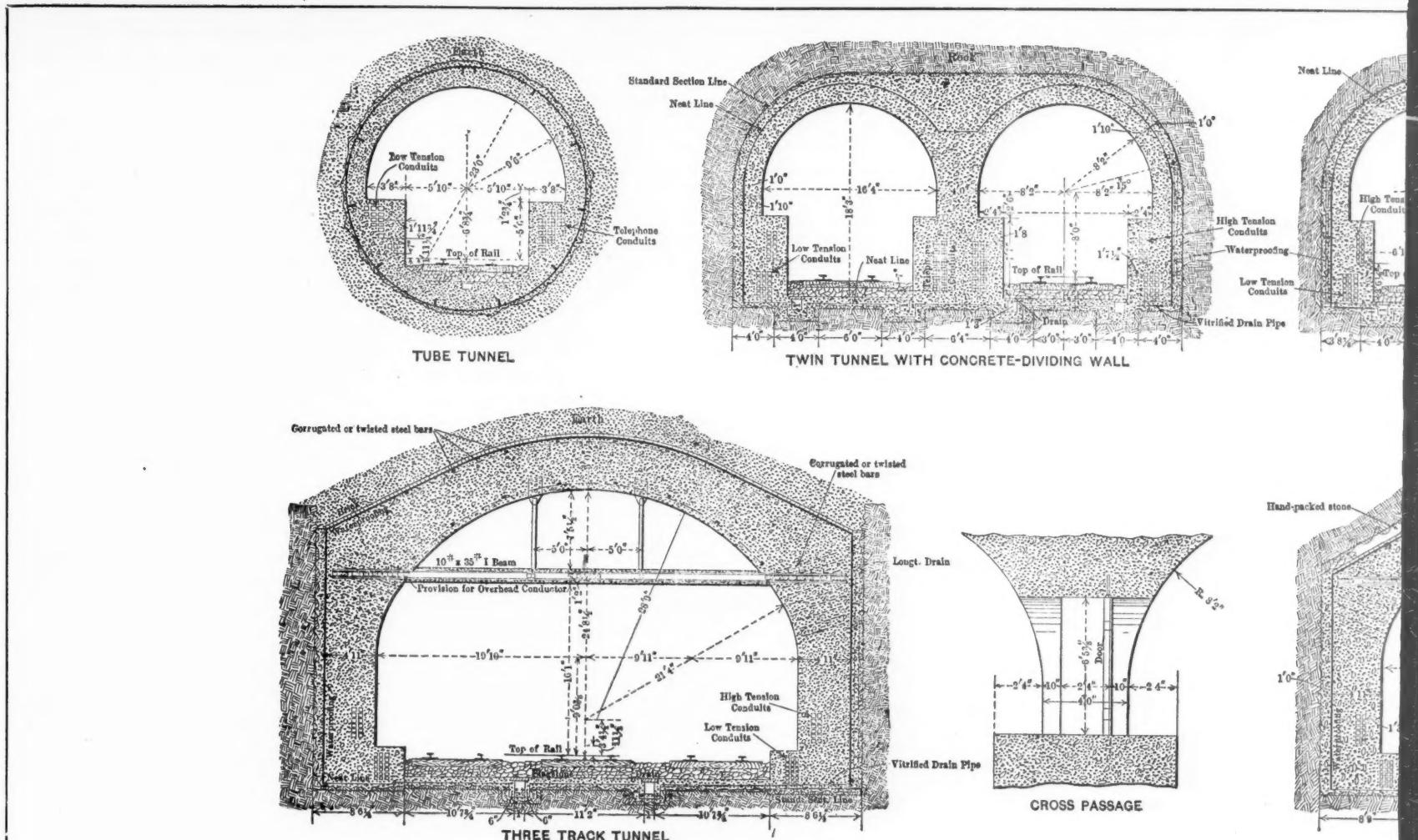




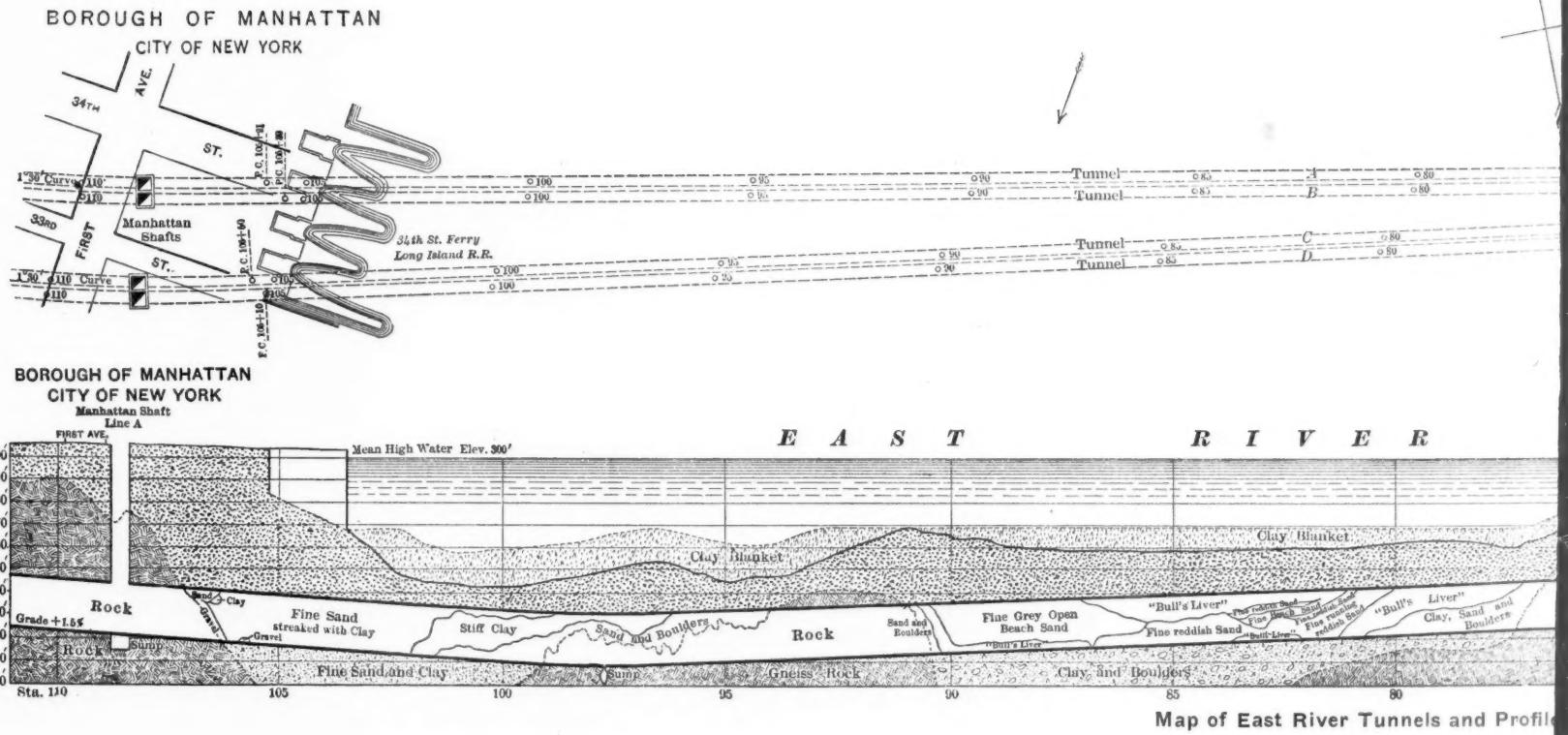
LONGITUDINAL SECTION, PACIFIC TYPE LOCOMOTIVE FOR THE WESTERN RAILWAY OF FRANCE.



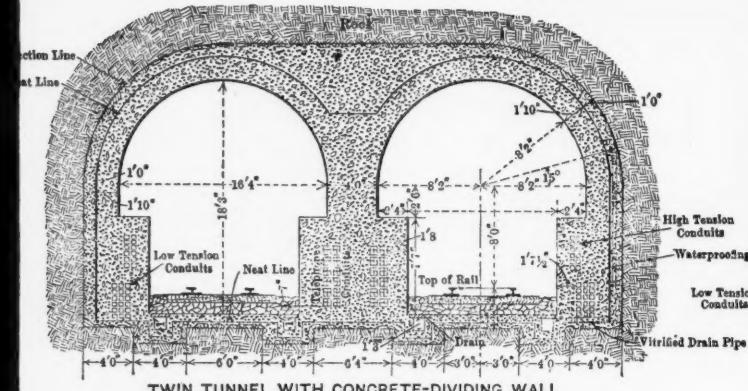
WAY OF FRANCE.



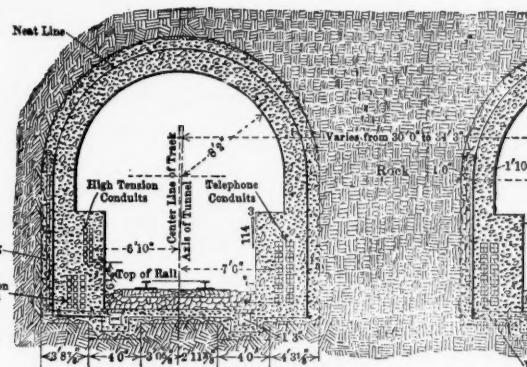
Typical Tunnel Sections.



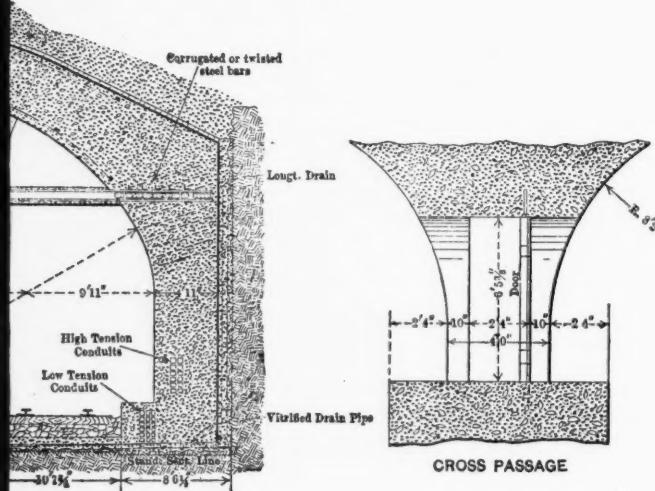
PENNSYLVANIA RAILROAD NEW YORK TUNNEL EXTEN



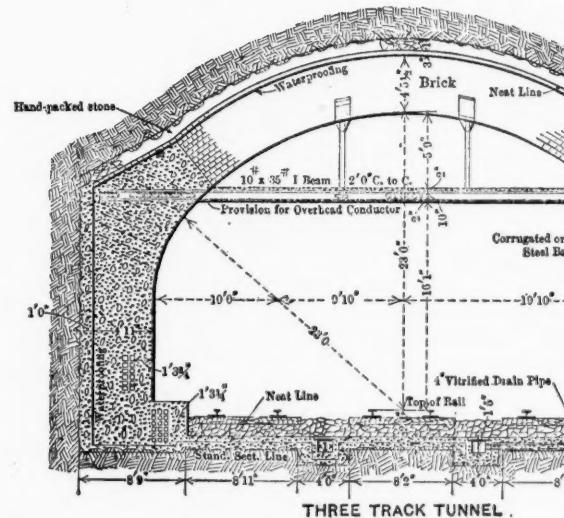
TWIN TUNNEL WITH CONCRETE-DIVIDING WALL



TWIN TUNNEL WITH ROCK-DIVIDING WALL

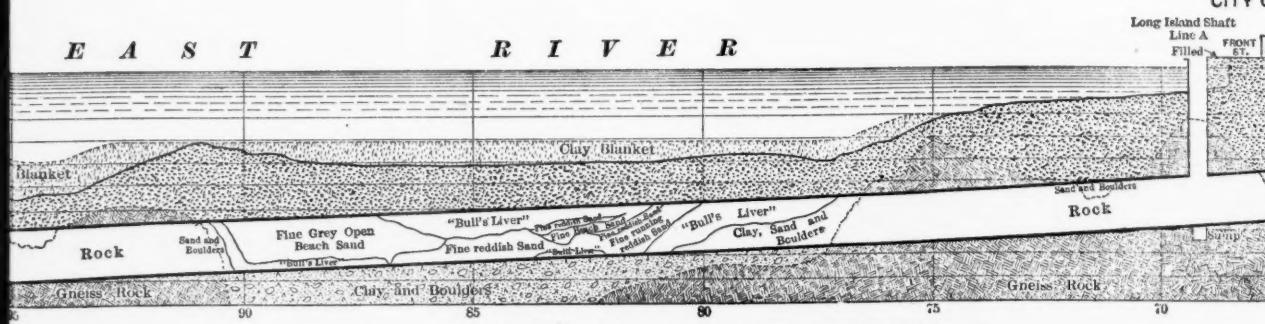
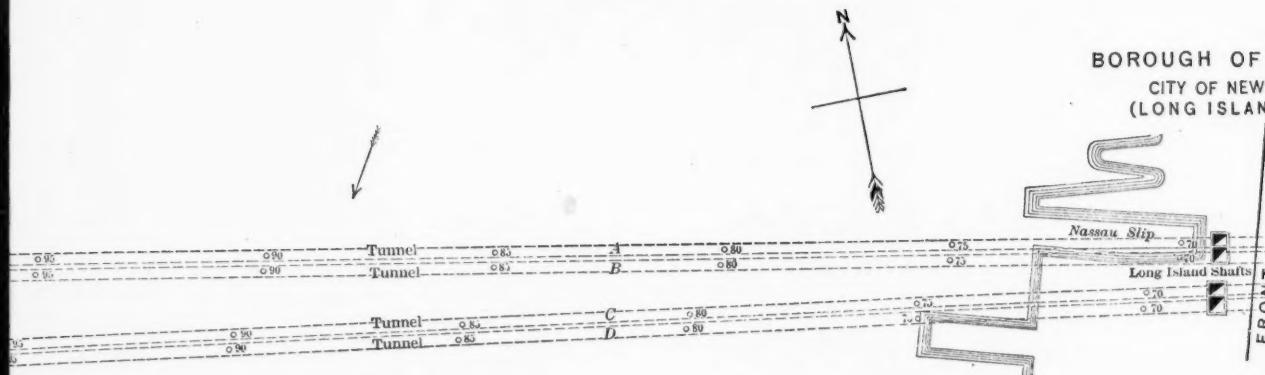


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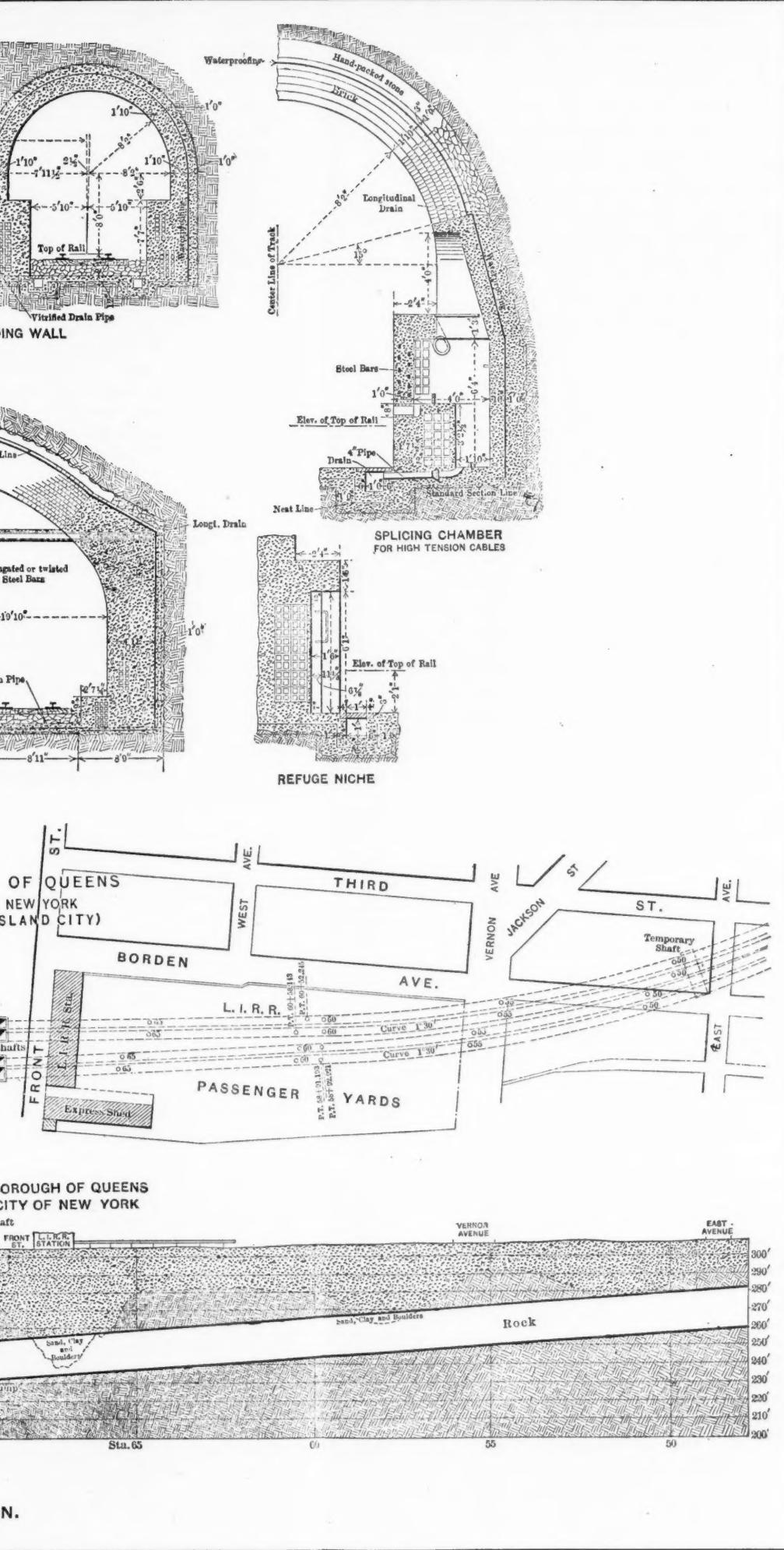
THREE TRACK TUNNEL.
BRICK ROOF

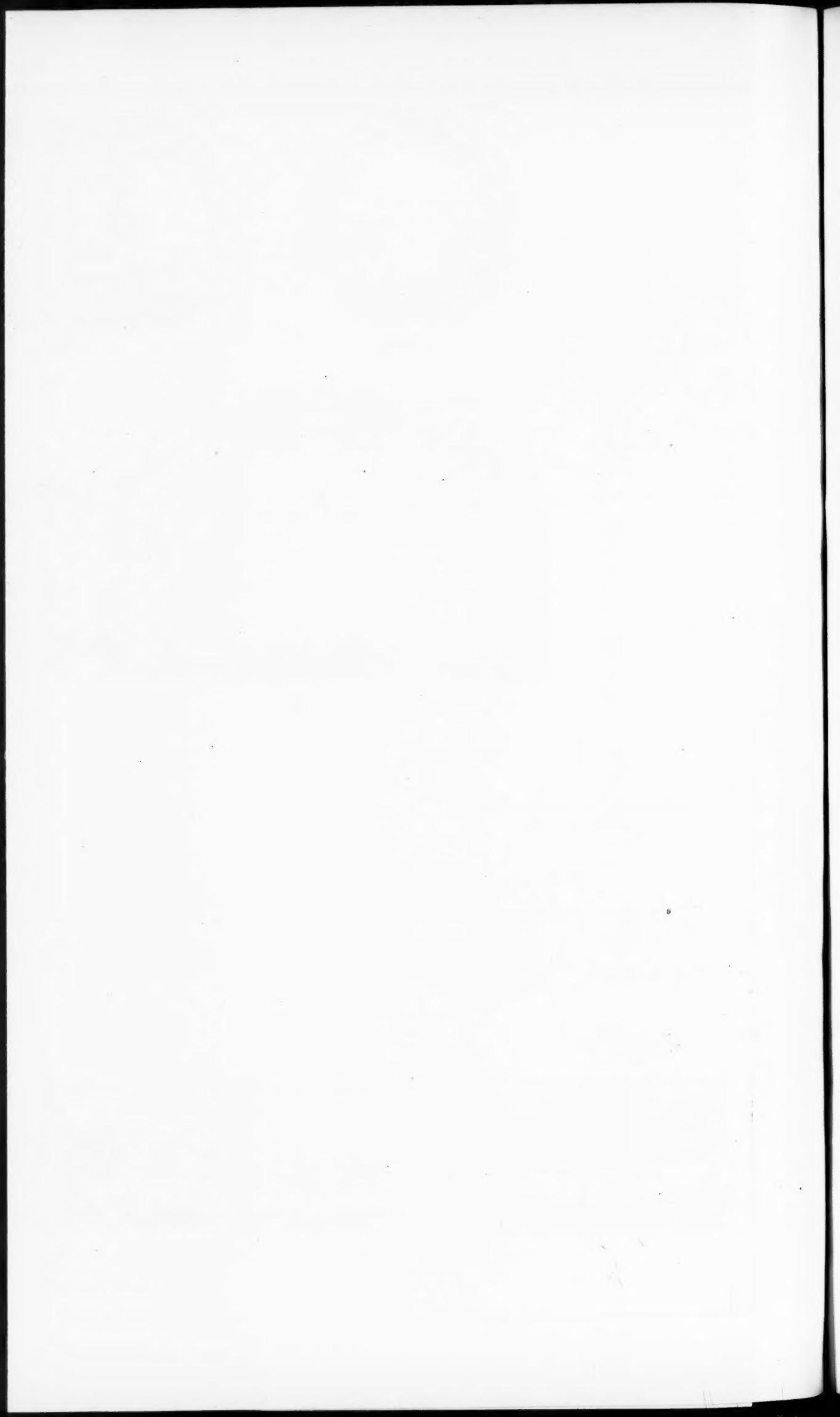
Typical Tunnel Sections.



Map of East River Tunnels and Profile of Line A.

PENNSYLVANIA RAILROAD NEW YORK TUNNEL EXTENSION; EAST RIVER DIVISION.





HISTORICAL SKETCH OF LIVE STOCK TRANSPORTATION.*

Prior to 1850 meat animals were driven to market on foot. From the region of Lexington, Ky., animals were driven 800 miles to New York City, taking 10 weeks. In 1847 a drove of 119 cattle was thus driven by three men. Another much-used route was from Lexington, Ky., to Charleston, S. C., about 550 miles. It was not uncommon to drive animals from as far west as Iowa to the eastern seaboard. In 1855 a drove of several hundred cattle arrived in New York City from Texas, four months having been consumed on the journey. In five years, ending in 1852, one man drove 13,000 sheep from Vermont to Virginia. In 1827 there passed through a turnpike gate on the Cumberland river 105,517 hogs on the way to the south Atlantic states. From 1865 to 1884 large numbers of cattle were driven from Texas to Kansas for grazing. As the railways were extended westward and more farmers settled on the lands, the northern terminus of this trail moved westward. In 1884 the number of cattle driven from the southwest to northern ranges was estimated at 416,000 head. In that year the first railway line was opened and thenceforth the number of animals driven rapidly diminished. Sheep were driven from Oregon, through Idaho, to the valley of the Platte, in Nebraska.

The average cost of bringing cattle in this way from Texas to Abilene, Kan., 700 miles, was \$2 a head and in addition there were losses averaging 40 cents a head. This sum (\$2.40) was less than freight rates are at present. Trails have been abandoned and rail transportation adopted wherever railways have become available. By railway the time is only a few days, as compared with months under the old plan. Hogs are hauled to stations in wagons. In 1906 statistics were gathered in 316 counties in central states, from which it appears that hogs were hauled an average distance from farm to shipping point, of 7.9 miles; cost \$2 a load, or 10 cents per 100 lbs.

One of the first shipments of cattle by rail was in 1852, from Cincinnati to New York, the cattle, 100 in number, having first been driven from Lexington. The cattle were carried in cars from Cincinnati to Cleveland, then by steamboat to Buffalo; then, after a stop of several days, they were driven to Canandaigua; then carried in cars to Albany, then, after two days, by boat to New York. From Cincinnati to Buffalo \$120 a car; total expense, Kentucky to New York, \$14 a head.

In 1870 cattle were taken by steamer from Texas to New Orleans, thence by the river to Cairo by boat; thence by rail to Chicago, and from Chicago to New York. Transportation of animals by water seems, however, not to have been very popular.

The grazing ranges of the west are to be found not only in Nebraska, Kansas and Colorado, but in practically all of the states.

Of the grazing regions in which cattle predominate, the largest extends northward from the mouth of the Rio Grande, with but one interruption, to the Canadian border, and westward for varying distances from a line corresponding roughly with the one-hundredth meridian. A second group of ranges on which cattle are greatly in excess of sheep extends along the Pacific coast from the Mexican border to the Columbia river; while a third group reaches from southern Utah through western and southern Arizona into southern New Mexico. Of the other ranges used chiefly for cattle, one group is located in the southwestern corner of Texas, another is in Wyoming south of Yellowstone National Park, a third touches the eastern shore of Great Salt Lake, and a fourth includes parts of northern Nevada and southern Oregon.

The principal region in which the grazing lands are used

chiefly for sheep is shaped roughly like the letter "T," with the top extending westward from central Wyoming to central Washington, and the stem reaching south from Montana to southern Nevada. Two other groups of sheep ranges are in central Montana and central New Mexico, respectively.

The supply of meat animals per thousand population has steadily decreased in the east, so that cattle are hauled increasingly long distances. The railways have taken the place of the old trails from the southwest northward and great numbers of animals are taken eastward from the Missouri river, from Chicago and from St. Louis to the Atlantic coast, through Cincinnati, Pittsburgh and Buffalo. There are also many local lines of cattle traffic. A train leaving Jackson, Mich., in the evening for the east is made up of cars brought to Jackson by four local freight trains coming in from as many different directions. Local shipments of cattle in Texas in six months in 1908 amounted to 350,000 head.

Of the total number of steers received at Kansas City in 1907, three-fifths came from the state of Kansas, many of these, however, being animals which had come from Texas and had stopped in Kansas to be fattened. Of the sheep received at Kansas City three-tenths came from Colorado and two-tenths from Kansas; of the hogs two-thirds from Kansas and one-third from Missouri.

In the years 1905-1907 the average annual receipts of cattle at Chicago were 3,300,000 head; at Kansas City 2,300,000; at St. Louis 1,300,000, and at Omaha 1,100,000. Chicago received 8,000,000 hogs and 4,600,000 sheep annually. In sheep, Omaha came next to Chicago, averaging 2,000,000 head, Kansas City 1,500,000. The average annual receipts of calves at Chicago during the three years named were 400,000; at Kansas City 260,000. The livestock centers are largely at slaughtering places, but Denver, St. Paul, Buffalo and New York are large cattle exchanges but not large slaughtering points. Each of these cities ships 70 per cent. of the animals received. Other cities shipping from 50 per cent. to 70 per cent. of their receipts, were: Sioux City, Pittsburgh, Philadelphia, Boston and Baltimore. In the years 1905-1907 the 13 principal markets received 25,000,000 hogs; and not more than 20 per cent. of these were reshipped. The average yearly export of meat animals from the United States increased from 139,000 head in the years 1878-1882 to 514,000 in 1903-1907. About three-quarters of these exports were from north Atlantic ports. Nearly all of these animals were cattle, few sheep and swine having been sent out.

The Union Stock Yards at Chicago cover 500 acres and have 13,000 enclosures. The yards will hold at one time 75,000 cattle, 125,000 sheep, 300,000 hogs and 6,000 horses. There are miles of alleyways among the pens, supplemented by overhead viaducts. The pumps can supply 8,000,000 gallons of water daily. There are facilities here for unloading 60 cars of stock an hour. The cost of yardage for cattle is 25 cents a head; calves 10 cents; hogs 8; sheep 5. At Buffalo the rates are somewhat lower than these. At a number of large stock yards in 1908 the charge for feeding ranged from \$1 to \$2 per 100 lbs. of hay; \$1 to \$1.50 per bushel of corn and 60 cents to \$1 per bushel of oats. At feeding stations in Wyoming, Idaho and Oregon cattle are turned out to pasture, the rates being from five mills to one and one-half cents a day.

On through lines between large centers such as Chicago and Buffalo, cars of stock are sent without attendants. Attendants are not so necessary now as formerly when animals were frequently thrown down in the cars, requiring constant attention to get them back on their feet.

From southern Idaho to Omaha cattle have to be let out of the cars to be fed and rested three or four times; between Omaha and Chicago once; between Chicago and Boston or New York once. The time of stock trains from Chicago to Pittsburgh is 25 to 29 hours, or 17 to 19 miles an hour, in-

*From a report by Frank Andrews, issued by the Department of Agriculture.

cluding stops; Kansas City to Buffalo, via St. Louis and Detroit, 56½ hours, or 18 miles an hour.

On June 30, 1907, the total number of livestock cars owned by the railways of the country was 70,000; number owned by other parties not known. Stock cars are made strong enough to carry 29 tons or more, but the average weight of a carload of cattle is less than half this. Double-deck stock cars were first used before 1860. In June, 1908, 17 roads, owning 44,000 livestock cars, had two decks in about one-fifth of these cars.

The average number of cattle loaded in a car at Kansas City and Omaha is 25; hogs, single deck, 75; sheep, double deck, 240. Estimating cattle at 955 pounds a head the 57,000 single deck cars owned by the railways in 1907 would hold 1,425,000 head (25 to the car), thus making the total weight only 41 per cent. of the carrying capacity of the cars. That is to say, the same weight of ordinary freight could be carried in 23,000 cars instead of 57,000.

In former times the unit of charge for transportation of livestock was the car and this has been blamed for much of the trouble due to crowding of animals. At present the rates are in cents per 100 lbs., and this change was made between Chicago and New York as early as 1879. West of the Rocky mountains and on routes from the southwestern ranges through Denver, the rates are still expressed in dollars per car. The average cost per head of moving steers from Texas to the ranges in Montana, North Dakota and South Dakota and thence to Chicago, in June, 1908, ranged from \$3.19 to \$4.70. These estimates include driving from the ranges to the railway station in Texas; the freight, at \$100 to \$137 per car; feed on the way at \$2 a car at each of three or four unloading points; care takers, estimated at \$2 a car, and driving from the railway station to the ranges. These estimates are based on putting 35 animals in a 36-ft. car. The animals having been fattened so as to require a car for each 25 head, the estimate of the cost per head from the northern ranges to Chicago is from \$4.72 to \$8.49. In this estimate the freight rate is given as 35 cents to 66 cents, and switching charges at Chicago, amounting to \$2 a car, are included. An estimate of the cost of transporting steers from northwestern Texas to London, England, including a stopover in Kansas for fattening, is from \$19.12 to \$28.15. In this estimate the total to Chicago is \$4.43 (low) to \$8.03 (high). From Chicago to New York the freight rate is given as 28 cents per 100 lbs. The ocean charges per head are: Freight, New York to London, \$6.60 to \$7.20; hay, 14 days, including three or four days at London, \$2.50 to \$4.50; attendants, 50 cents to 60 cents; total, New York to London, \$9.60 to \$12.30.

The cost of moving sheep from Texas and New Mexico to Colorado and Kansas and thence to Chicago is 50 cents to \$1.50 per head; Chicago to New York, 35 to 45 cents. Live hogs, 200 lbs., each from farms in Illinois, Missouri, etc., to Chicago, 70 cents to \$1.50 per head.

In 1892 out of 98,731 cattle sent from Montreal to Europe 646 or .7 of 1 per cent. were lost at sea. In the following three years the percentage of loss grew less. In 1908 the insurance on cattle from New York to England was one-fourth of 1 per cent.

Formerly, when steamship facilities were poorer, insurance rates were from 2 to 10 per cent.

Seven carloads of live stock yield an average of 50 tons of fresh beef; and from Chicago to New York, in 1908, the expenses of the railway on an export steer weighing 1,250 lbs., amounted to over \$4, while the freight on the average amount of fresh beef yielded by such an animal, 700 lbs., would amount to \$3.15, not including the expense of icing. From Chicago to Liverpool the cost of carrying a live animal is more than double the cost of shipping the average weight of fresh beef yielded by the animal.

Reviewing the foregoing facts, it is found that the railways and steamships have introduced important economies in the traffic, and the result is shown in lower freight rates. The

size and efficiency of cars and vessels has been increased. The losses in transit have been reduced by mechanical improvements, and by legal regulations. The growth in the business of transporting meat instead of live animals has led to the establishment of new slaughtering centers nearer the sources of supply.

In connection with the foregoing there is interest in the following figures, recently published, concerning England's receipts of beef from South America:

"Great Britain's imports of frozen and refrigerated beef last year amounted in value to \$51,541,900, of which the Argentine sent \$30,514,630 worth, the United States \$16,324,920, and all other countries \$4,684,350. American beef companies are now interested in the South American pampas, having in view, it is said, the control of a new field of production which will enable the "beef trust" to retain its monopoly both in the United States and in Great Britain. The Argentine meat supply is said to be rapidly increasing and to be capable of great development. Of the total foodstuff imported into Great Britain and Ireland last year, the Argentine furnished nearly 41 per cent.—of wheat 34.2 per cent., of maize 54.5 per cent., of frozen mutton 30.8 per cent., and of refrigerated and frozen beef, as already shown, 60 per cent."

EMPLOYEES' HEALTH AND COMFORT.

Henry R. Towne, president of the Yale & Towne Manufacturing Co., New York, in a recent public address on "Prevention Versus Cure in Industrial Operations," gives a most interesting statement of the amount invested and annually expended for employees' health and comfort at the company works at Stamford, Conn.

<i>Investment.</i>	
1. Heating and ventilating	\$74,200
2. Sanitation, drainage and water supply	49,400
3. Lighting, electric and gas	18,000
4. General cleanliness	.....
5. Drinking water; filtration, refrigeration and distribution	6,200
6. Lavatories (included in item 2)	57,200
7. Locker rooms and lockers	1,200
8. Emergency room and equipment	8,000
9. Apparatus for removal of dust and fumes	4,000
10. Safety appliances on machinery	7,000
11. Library, reading rooms, lecture rooms and bicycle sheds	.....
Total	\$225,000

<i>Annual Operating Expenses.</i>	
1. Heating and ventilating	\$14,620
2. Sanitation, drainage and water supply	6,324
3. Lighting, electric and gas	3,129
4. General cleanliness	4,811
5. Drinking water	932
6. Lavatories (included in item 2)	.....
7. Locker rooms and lockers	6,467
8. Emergency room	1,303
9. Apparatus for removal of dust and fumes	1,200
10. Safety appliances on machinery	445
11. Library, reading rooms, lecture rooms and bicycle sheds	6,206
Total	\$45,437

In round figures the foregoing statements imply an investment for the above purposes of about \$100 per employee, and an annual expenditure of about \$20 per employee. While admitting frankly that this expenditure, both fixed and current, is "good business," because tending to increase the efficiency of labor and the contentment of employees, it can with equal fairness be stated that, if limited strictly to business requirements, these outlays, both fixed and current, would largely be reduced, probably one-half, and that the excess over what is necessary represents, on the one hand, a voluntary contribution by the employer to the welfare, comfort and health of the employee, and, on the other hand, a substitute or equivalent, to the employee, of a direct contribution to an insurance or pension fund, because serving indirectly a similar purpose by increasing the earning power, by prolonging the activity, and thus by augmenting the potential savings of the employee. In considering the broad subject of industrial insurance and pensions it is pertinent to keep in view the character and influence of the expenditures thus made by the employer, especially in modern plants of the best type, and to recognize the substantial contribution made for the benefit of the employee.

General News Section.

The San Pedro, Los Angeles & Salt Lake has put on a new through train each way daily. It leaves Salt Lake City, westbound, at 9 a. m., and Los Angeles, eastbound, at 2 p. m.

The Grand Trunk Pacific is now running passenger trains every other day to Wainwright and a mixed train from Wainwright to Edmonton. The time through from Winnipeg to Edmonton, 792 miles, is 35 hours.

The Southern Pacific has just put in service at New Orleans the Mastodon, a new steel car float 369 ft. long and 50 ft. wide. It will carry 28 freight cars or 15 passenger cars. The barge weighs 1,300 tons and draws 28 in. of water.

The new station at Chattanooga, Tenn., used jointly by the Southern, the Queen & Crescent and the Central of Georgia, was opened for business on December 1. The new station is on Market street, one block south of the old station.

The Atchison, Topeka & Santa Fe has given an advance of \$5 a month in wages to telegraph operators in relay offices, to wire chiefs and to telegraph office managers. The bulletin announcing the advance says that it is made in recognition of efficiency and to encourage loyalty. No increase had been asked for.

The Western Pacific was opened through to its western terminus on December 1, but it was not expected that through freight would be accepted for several days, as the interstate tariffs had not been published according to law. The telephone line which had been in use during the construction of the railway was, on December 1, superseded by a telegraph line.

In Pittsburgh, Pa., last week, the Pennsylvania State Railway Commission held a hearing to listen to complaints of inadequate street car service; and after two hours stopped the hearing, saying that abundant proof of necessity for relief had been given, and announcing that the commission would send an expert to "assume charge of operation" of the lines for a time.

Scarcity of water is now reported in many parts of the eastern states. In Pennsylvania the drouth has interfered with traffic to some extent for many weeks. Last week the Pennsylvania Railroad sent a large number of tank cars to the Erie division, to be used for hauling water for locomotives. The Philadelphia & Reading is hauling a million gallons a day for the engines in its coal mines.

The first annual report of the Fifth Avenue Coach Company, which runs electric omnibuses on Fifth avenue, New York, and charges a 10-cent fare, has been sent to the New York Public Service Commission. It shows that the company has a total investment of about \$400,000, and in the year ended June 30, 1909, total revenues from passengers amounted to \$369,405. Expenses of bus operation were \$225,566; gross corporate income, approximately \$144,700.

The proposal to build moving sidewalks in New York City, which has been the subject of favorable action by the State Public Service Commission, was last week favored also by the Board of Estimate of the city, which adopted a resolution requesting the Public Service Commission to prepare plans for a route along Thirty-fourth street from Second avenue to Ninth avenue, about 1½ miles. The Continuous Transit Securities Company, which desires to build a moving sidewalk, had proposed a number of routes, one of which was along Broadway from Tenth street to Forty-second street; but a committee of the Board of Estimate, which considered the question, held that it would be unwise at this time to build in Broadway because of questions yet undecided as to the grades of north and south subways, which probably will be built in the near future.

Curiously enough, the dissolution of the Rock Island-Frisco lines is not received with enthusiasm in Oklahoma, which recently has been trying to make for itself a record as the champion railway and trust busting state in the Union. J.

E. Love, chairman of the State Corporation Commission, is quoted in a newspaper interview as saying that the dissolution means a serious loss to Oklahoma shippers. This loss is due to the fact that the dissolution makes inoperative the so-called one-line freight order of the Corporation Commission. This order considered the Rock Island and the Frisco lines as one system, and, in accordance with the state law, required them to make lower rates on shipments moving over both lines than a single line can be required to make. Now that these roads are under separate management, they are at liberty to charge so-called two-line rates. As the Rock Island and the Frisco together operate 2,805 of the 5,700 miles in Oklahoma, practically one-half of all the long hauls in the state will now be subject to higher rates. Mr. Love estimates the direct loss to shippers from this cause at \$1,000,000 annually.

On Tuesday afternoon of this week a special train over the Lake Shore & Michigan Southern and the New York Central & Hudson River arrived in New York City in 17 hours, 46 minutes from Chicago. The train left Chicago at 8:33 p. m., Central time, on Monday, and arrived in New York at 3:19 p. m. There was a delay of 48 minutes at Hudson on account of the failure of the locomotive. Except for this, the time would have been 16 hours, 58 minutes. The time to Hudson was the best that has ever been made eastbound, though it was beaten westbound last March, when a special train was run from 138th street, New York City, to Chicago in 16 hours, 30 minutes. The run of this week was made for Samuel Newhouse, of Utah, who was on his way from Salt Lake City to Paris, to see a brother who is critically ill. Mr. Newhouse left Salt Lake at 12:05 p. m., December 4, but was delayed about nine hours in Wyoming by a snow storm and severe cold weather, so that he missed the Twentieth Century Limited at Chicago, and ordered the special in order to make sure to be in time for the Steamship Lusitania, sailing from New York Wednesday morning. The reporters say that for the special train from Chicago Mr. Newhouse paid 100 first-class fares, at two cents a mile, amounting to \$1,960. According to this statement, the charge was for 980 miles, whereas the actual distance is about 964 miles. Mr. Newhouse expects to land at Fishguard, Wales, and take the boat train from there to Dover; and with fair weather expects to be in Paris on Tuesday night, ten days from Salt Lake City.

Failure of the Northwestern Strike.

The strike of switchmen in the Northwest, reported last week, page 1095, was soon over. Following is the substance of the press despatches that have been published since our last issue, including those dealing with the strike gossip which, as is usual in such cases, has sprung up in many other cities, but excluding the innumerable predictions of what was going to happen if the strikers succeeded:

St. Paul, Dec. 2.—Several conferences held between the chief of police and the railway officers. Three hundred new men arrived from Chicago and distributed in St. Paul, Minneapolis and Duluth. At Duluth stones were thrown from overhead bridges and one engineman was cut by flying glass. (This is the only violence reported anywhere.) Strike breakers at St. Paul said to be illegally wearing police badges. Mayor Lawler, of St. Paul, appeared as a friend of the strikers. Railway officers said they were handling 30 per cent. of all business offered and in a week would have the strike obliterated. Five switching engines at work in the Union Station yards. Some through freights and all-way freights running on Northern Pacific.

Great Northern shops at St. Cloud and St. Paul closed. All but one of 23 flour mills in Minneapolis idle. Switchmen claimed trainmen in the West joining the strike. Butte and Missoula divisions said to be most completely tied up. Smelters at Great Falls closed; Amalgamated mines at Butte closed.

Chicago, Dec. 2.—Committee of railway officers from St. Paul arrived in Chicago and issued statement to the effect

that Mr. Hawley had joined the committee in the telegram to Messrs. Knapp and Neill, November 23, asking mediation. Benjamin Thomas, president of the Managers' Association, said there was not on record such an unreasonable and inexcusable strike as this.

St. Paul, Dec. 3.—About 1,500 men have been brought in from the East to take the place of strikers, and the officers of the Northern Pacific and the Great Northern asserted that the strike was about over. The managers of the strike declared that the strike was only just begun, but they presented no facts to justify such a statement. The governor of Minnesota recommended that the governors of all of the states along the transcontinental lines organize a board of mediation. President L. W. Hill, of the Great Northern, said that the general managers had decided to stand together in their dealings with the switchmen; they had not brought from the East all the men that they could, because they wished to give the old men a chance to take back their jobs.

Chicago, Dec. 3.—Officers of the Chicago, Burlington & Quincy said that freight was being taken by that road for all points. A report from Helena, Mont., said that the Northern Pacific was running a few freight trains, but the Great Northern practically none at all. The Chamber of Commerce at Great Falls, Mont., adopted resolutions denouncing the Union leaders for refusing to arbitrate. At St. Paul and Minneapolis retail coal dealers were refusing to sell more than 1,000 lbs. to any one purchaser. The Northern Pacific had found it necessary to bring coal from Duluth to keep its passenger trains running west of St. Paul.

December 4.—The General Managers' Committee announced at Chicago that no more new men would be employed, as many of the striking switchmen were returning to work. All roads canceled all embargo notices, and they were accepting and moving without interruption all traffic, including live stock and perishable freight.

At St. Paul it was said that some of the flour mills had resumed business, and the mines at Butte had reopened.

St. Paul, Dec. 5.—Cold and snow were delaying freight traffic more than the strike of switchmen, and passenger trains were from one to four hours late. Fifteen switching engines were at work at Tacoma and normal conditions were being restored at Seattle. The Great Northern announced that freight was being handled at Minnesota Transfer for the first time since the strike.

At St. Paul on Friday, 60 switching engines were at work and on Saturday 35 more. This produced nearly normal conditions.

Chicago, Dec. 7.—The telegraphers of the Illinois Central, having asked for an increase of 10 per cent. in their pay and the company refusing, the officers of the road and of the telegraphers' brotherhood joined in submitting the question to Messrs. Knapp and Neill, government mediators, to whom telegrams were at once sent.

The general superintendent of the Michigan Central is reported as saying that the conductors and brakemen of that road had their pay increased 15 per cent. several weeks ago. The telegraphers on the M. C. are still asking for an increase of pay, an offer affecting 50 offices, which had been made by the company, having been rejected.

The telegraphers of the Pere Marquette had their pay increased 5 per cent. last September. The firemen of that road have been granted from 5 to 7 per cent. increase, and negotiations are now going on with enginemen, trainmen, switchmen, boiler-makers and machinists.

Officers of the Cleveland, Cincinnati, Chicago & St. Louis have been holding conferences with a committee of telegraphers concerning wages.

St. Paul, Dec. 7.—A committee of jobbers and manufacturers, after an investigation, reported that freight was moving satisfactorily. Notwithstanding this, the representatives of the striking switchmen say that they have the railways tied up.

In the East the newspapers have printed a great deal about the agitation which railway employees are said to be carrying on, looking to increases in wages, and the statements purport to reveal the inmost thoughts of the brotherhood leaders; but railway officers say that no demands have been made, and the truth appears to be that the leaders of the brotherhoods are hoping to be able to formulate proposals for increased pay to

be presented some time in January. Numerous prominent railway officers—who, however, are not named—are quoted as having intimated to the reporters that the decided increase in the cost of living makes necessary a careful consideration of the question of increased pay for employees.

The leaders of two brotherhoods—the conductors' and the trainmen's—are reported to be working together with a view to presenting their requests to the railways simultaneously.

The committee of railway officers which managed the St. Paul negotiations was made up of the following:

I. G. Rawn, Chairman, President Monon Route; W. C. Nixon, V. P. and G. M. St. L. & S. F.; J. M. Gruber, General Manager Great Northern; A. L. Mohler, Vice-President Union Pacific; R. H. Aishton, General Manager Chicago & North Western; A. W. Sullivan, General Manager Missouri Pacific; J. E. Hurley, General Manager Santa Fe; G. T. Slade, Vice-President Northern Pacific; F. O. Melcher, General Manager C. R. I. & P.; D. L. Bush, General Manager C. M. & St. P.

The signed statement which was issued by this committee on December 2, contained a copy of the telegram which was sent November 23 to Washington, inviting Messrs. Knapp and Neill to act as mediators, and to it are attached two signatures: that of I. G. Rawn, on behalf of the railways, and that of F. T. Hawley, president of the Switchmen's Union. It appears that the subsequent refusal of the Switchmen's Union to submit their case to the mediators was on advice of counsel.

A committee composed of F. O. Melcher, chairman; R. H. Aishton, A. M. Schoyer, W. J. Jackson and D. C. Moon, has been appointed by the railways to confer with the switchmen in the Chicago district regarding advances in pay.

With a view to putting at rest sensational reports regarding a threatened general strike, W. J. Lee, of the Brotherhood of Railroad Trainmen, on December 6, after a conference with W. S. Carter, of the firemen's brotherhood, and A. B. Garrison, of the conductors' telegraphed President Taft that

"The press reports indicating that a strike of the Brotherhood of Railroad Trainmen and other affiliated railway organizations is threatened at this time as a result of demands made for increased pay in the territory east of Chicago are absolutely without foundation. Whatever action is taken by the organization I represent will depend entirely upon the individual expression of the members through the general committees for the railways in the territory, and will be handled in the usual manner. The demands of the employees east of Chicago cannot take proper form for consideration before the early part of 1910. All this talk about a threatened strike of the Brotherhood of Railroad Trainmen and affiliated organizations is absurd."

Mr. Lee says that his brotherhood has 30,000 men doing yard work, while the Switchmen's Union has only 7,000 members in the entire country.

New York State Canal Contracts.

The New York State Superintendent of Public Works, F. C. Stevens, has awarded barge canal contract No. 72, dredging a channel in the Hudson River between locks No. 2 and 4, about four miles, to Shanley-Morrissey (Inc.), New York, for \$1,192,758, and contract No. 2E, for completion of contract No. 2, at Waterford, to Holler & Shepard, Rochester, for \$261,667.

A Suggestion for President Taft's Coming Special Message.

If Luther Burbank should be able to combine several different fruits into one, and thus form a new and better fruit, under the Sherman law would this be an illegal combination? —*Wall Street Journal*.

Yes; of course. It would be illegal even to arrange an interview between members of diverse species.

Telephones for Train Despatching.

The Louisville & Nashville is installing a telephone train despatching circuit between New Orleans and Mobile. It will be the first to be introduced in that section of the country and the second circuit installed by this railway, the former one being between Louisville and Cincinnati. Western Electric apparatus is used. The same is used also by the Chicago & Northwestern in a despatching circuit just being put in from Chadron, Nebraska, to Long Pine, 198 miles. Between Chadron and Long Pine during certain seasons of the year many of the stations consist simply of sidings, but during a large portion of the year they are important shipping points for the

ranchers, and telephones will be put in so that any authorized person can order stock cars or other freight accommodations with the least possible delay.

Power in Reserve.

The picture given herewith shows 71 new locomotives for the Western Pacific, as they were gathered at Salt Lake City, in the yard of the Denver & Rio Grande, just before the opening of the last division of the road. All of these engines came from the American Locomotive Works, mostly from the Schenectady shops. Most of these engines are designed to burn oil, and the oil tank is a prominent feature in the views of



Seventy-one Western Pacific Locomotives.

the two engines nearest the observer, at the right of the center of the picture. Twelve of the engines are switchers. All of the engines are simple; the passenger engines have cylinders 22 in. x 26 in. and 67 in. drivers. The freight engines are eight coupled with 26 in. x 30 in. cylinders and 57 in. drivers.

Mr. Delano on Chicago Terminals.

F. A. Delano, president of the Wabash, in a recent extemporaneous talk on "Railroad Terminals" to the Chicago Engineers' Club, said:

"I was for nine years superintendent in the Burlington yards in Chicago, and during that time naturally became much interested in the subject of railway terminals. In no city is there anything like the complexity of railway approaches that is found in Chicago. Buffalo presents a similar problem but on a smaller scale. More roads come into Chicago than anywhere else. The country is flat and there are no particular lines of approach. There are upwards of 30 lines of railway radiating from Chicago. Almost every one of these lines crosses and recrosses other lines. In the minds of newspaper editors all that is necessary is just to fix matters so there will not be so many crossings. So far as the physical complications are concerned, railway engineers could easily unravel them, but each railway has established industries on its lines which it could not afford to forsake. No one but a czar could rearrange these tracks so as to eliminate all of their complications and the chances of a general rearrangement are very small."

"There is a wide difference between the problems of arranging passenger terminals and of arranging freight terminals. In a small town it is very desirable for a railway to get to the center with its passenger and freight terminals. In a big city it is much harder to say from the standpoint of passenger business where the center is. The center of population in a large city is not the ideal location for passenger terminals because there is much of the population that does not travel. Of the part of the population that does travel there is a wide difference between those who use only suburban trains and those who use through trains. The man who is leaving his home, hotel or club for a long journey does not object if he has to take a street car to the station, but the

suburban traveler wants to go to his home or to his office without intermediate transportation.

"The problem of handling freight at terminals is much more complicated. Freight has to be carried after it reaches the terminus and the expense of handling it at terminals is increasing by leaps and bounds. In spite of this, we are handling it by the same awkward and expensive methods to-day as when railways were started. At a freight house freight has to be trucked 500 to 1,000 ft. perhaps. We have carefully calculated the ton mile cost of hauling freight in trains but we do not know how much it costs per ton mile to handle freight at freight houses by hand power. Attempts have been made to devise schemes for handling freight at terminals by machinery, but no satisfactory plan has been worked out. It appears that the time must come when, instead of trying to set cars for freight on property worth \$20 to \$25 per square foot, we shall carry on these terminal operations outside the congested district of large cities."

Mr. Delano referred to the paper on railway passenger terminals in Chicago, which he originally prepared in 1904 and which he revised in 1906 in the form of a paper which he read before the real estate board of Chicago. The plan he outlined then was to concentrate the various passenger stations on Taylor street or Twelfth street near the Chicago river. He said that this could not now be carried out, as the Chicago & North Western is building a station and terminals on a fine plan of its own, but he indicated that he still believed in the feasibility of some plan of better arranging passenger and freight terminals. He continued:

"The ideal place to bring in the various railway lines is somewhere between Twelfth and Sixteenth streets east of Canal street. I have never favored the building a union passenger station in Chicago. It would be too large a unit. The distances in our enormous terminals are already too great, and, of course, the distance in a union terminal in Chicago would be greater than any other. The maximum number of tracks should be 30 to 32. A number of union stations side by side would be preferable in Chicago. We now have six passenger terminals. Even if each group of roads developed a fine terminal where its existing station is the situation would still be unsatisfactory. There would be no co-ordination with any intramural system of transportation. We shall soon have one group of stations on the west side near Madison and Clinton streets, if it be true, as reported in the newspapers, that a new union station is to be built very near the new station of the Chicago & North Western. We might then have another group on Twelfth street, and this would be more satisfactory than to have the stations scattered as they are now. Twelfth street should be made a wide cement street capable of handling the boulevard traffic, street cars and the heavy team traffic to and from the west side. It is already improved from Ashland avenue west and it should be improved from Ashland avenue east across Michigan avenue.

"I first suggested that the railways should sell all of their properties north of Twelfth street and concentrate their stations below that, but it is probable that this would be impracticable. The railways probably never will want to sell their property north of Twelfth street, and it would be difficult for them to give title even if they did want to. They need not occupy all of their property north of Twelfth street with tracks, sheds, etc. It could be developed by the construction of warehouses for goods requiring railway facilities. Buildings 12 or 14 stories high could be built above the track levels, which, according to this plan, would be above the street level, and the ground level could be used for a clearing house for the receipt and delivery of freight. The Hudson Terminal building in New York has been thus erected over the McAdoo tunnel, and this is one of the finest pieces of engineering work in the country. It is easier to excavate in Chicago than in New York, but we should encounter other engineering troubles here in providing foundations."

The address was discussed at a luncheon at the club on November 30 by A. S. Baldwin, W. H. Finley, E. H. Lee, E. N. Layfield and M. K. Trumbull.

Toledo Transportation Club.

The second annual banquet was held on the evening of December 2, with about 230 members and guests present. The

principal speakers were Thomas M. Osborne, member of the New York State Public Service Commission, Second District; L. E. Johnson, president of the Norfolk & Western, and E. J. McVann, manager of the Omaha Traffic Bureau.

New York Railroad Club.

The third annual Christmas entertainment will be held at the building of the United Engineering Societies, on Friday evening, December 17, after a brief business session. The programme will include a vaudeville entertainment and luncheon.

Canadian Society of Civil Engineers.

A meeting of the electrical section was held on December 9. A paper on A 2750 Volt Direct Current System, by A. H. Barringer, was read by the author.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 10-13; Indianapolis.
 AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; June, 1910; Niagara Falls, Ont.
 AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASSN'S.—G. W. Dennison, Penna. Co., Toledo, Ohio.
 AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
 AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 18; New York.
 AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.
 AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago, March 14-17, 1910; Chicago.
 AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.
 AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.
 AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
 AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
 AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
 AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.
 ASSOCIATION OF AM. RY. ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.
 ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; May; Nashville, Tenn.
 ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.
 ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, N. Y.; Dec. 14-15; Chattanooga.
 CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
 CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
 CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
 FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.
 INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
 INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May; Chicago.
 INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.
 IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
 MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.
 NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
 NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
 NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
 RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
 RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
 RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio; May 16-18; St. Louis.
 ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.
 ST. LOUIS RAILWAY CLUB.—B. W. Fraenell, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
 SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago.
 SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
 SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R. R., East Buffalo, N. Y.
 WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Monday, except June, July and August; Winnipeg.
 WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Interstate Commerce Commission has decided to begin an investigation of milling in transit and storage in transit privileges and the rules relating thereto.

Representatives of the Kansas City, Mexico & Orient have indicated to the corporation commission of Oklahoma that this road will ask to be exempted from the operation of the 2-cent fare provision of the Oklahoma constitution.

On the joint line of the Canadian Northern Quebec and the Canadian Northern Ontario through passenger trains are now running nightly between Ottawa and Quebec. The route is by way of Hawkesbury, St. Jerome, Joliette and Grand Mere.

In the month of November, according to the *El Paso Herald* (Tex.), 50,000 head of cattle passed through that city northward from Chihuahua, destined to American packing-houses. Other parts of Mexico are also sending large numbers of cattle to the United States.

Governor John T. Shafroth and five other members of a committee appointed by the Colorado Immigration Tourist Rate Bureau appeared before the executive committee of the Western Passenger Association in Chicago on December 6 and asked that a colonists' rate of \$17.50 be made to Colorado, and that a round trip summer tourist rate of \$25 instead of \$30 be made.

Crop Conditions.

The crop reporting board of the United States Department of Agriculture estimates that the newly seeded area of winter wheat is 7.9 per cent. more than the revised estimated area sown in the fall of 1908, equivalent to an increase of 2,449,000 acres, the indicated total area being 33,483,000 acres.

The condition of winter wheat on December 1 was 95.8 against 85.3 and 91.1 on December 1, 1908 and 1907, respectively, and a 10-year average of 91.5. Comparisons for winter wheat states follow:

States.	Area sown*			Condition Dec. 1.		
	Autumn 1908, revised, acres.	Autumn '09, preliminary, acres.	Total acres.	1909, Per ct.	1908, Per ct.	10-yr. average, Per ct.
New York	442	451	96	92	94	94
New Jersey	114	114	92	98	94	94
Pennsylvania	1,593	1,593	86	88	92	92
Delaware	120	120	88	99	93	93
Maryland	787	803	85	95	92	92
Virginia	800	808	85	96	90	90
West Virginia	381	419	91	80	88	88
North Carolina	584	672	89	93	92	92
South Carolina	394	473	92	92	94	94
Georgia	258	284	90	94	95	95
Ohio	1,786	2,036	95	62	84	84
Indiana	2,404	2,765	98	65	87	87
Illinois	2,000	2,300	100	72	90	90
Michigan	821	920	94	74	85	85
Wisconsin	64	69	97	83	94	94
Iowa	156	175	98	90	94	94
Missouri	2,143	2,207	98	90	92	92
Nebraska	2,586	2,767	98	89	94	94
Kansas	6,258	6,195	98	92	93	93
Kentucky	711	782	97	80	90	90
Tennessee	825	949	95	87	90	90
Alabama	103	134	95	91	94	94
Mississippi	1	2	94	90	92	92
Texas	925	1,295	95	89	94	94
Oklahoma	1,337	1,604	98	89	93	93
Arkansas	156	187	93	84	90	90
Montana	225	304	99	..	..	..
Wyoming	26	39	95	95	..	..
Colorado	97	116	93	..	..	..
Utah	148	163	97	99	..	..
Idaho	339	359	100	98	97	97
Washington	818	736	93	98	93	93
Oregon	552	497	94	98	96	96
California	1,080	1,145	100	92	96	96
United States	31,034	33,483	95.8	85.3	91.5	91.5

*Last three figures in these columns omitted.

The newly seeded area of rye is estimated as being 1.2 per cent. more than the revised estimated area sown in the fall of 1908.

This is equivalent to an increase of 25,000 acres, the indicated total area being 2,155,000 acres.

The condition of rye on December 1 was 94.1 as compared with 87.6 and 91.4 on December 1, 1908 and 1907, respectively,

and a 10-year average of 93.9. Comparisons for important states follow:

States.	Area sown,		Condition, Dec. 1.		
	Autumn of 1909, Compared with 1908, preliminary,	Total acres.	1909, per ct.	1908, average per ct.	10-yr. per ct.
Michigan	102	367,000	95	81	92
Pennsylvania	100	385,000	87	90	94
Wisconsin	104	307,000	97	86	96
New York	102	178,000	96	92	96
Minnesota	100	125,000	93	91	94
Nebraska	97	84,000	97	90	94
New Jersey	102	87,000	94	100	96
Illinois	102	76,000	98	80	94
All other	101	546,000	96	88	94
United States	101.2	2,155,000	94.1	87.6	93.9

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 59-A, giving a summary of car shortages and surpluses by groups from July 22, 1908, to November 24, 1909, says:

"There has been an increase in the surplus of 2,912 cars

cost at warehouse of consignees. Consignees accepted delivery at freight house, drayed shipment to their warehouse and demanded from carrier refund of sum equal to cost of such drayage; held, that consignees should have insisted on the proper delivery provided for in carrier's tariff, and that the commission is without authority to order or sanction refund in the case. (17 I. C. C. 175.)

STATE COMMISSIONS.

L. P. Tarlton has been elected chairman of the Kentucky railway commission.

E. J. Doolittle has been appointed a member of the railway commission of Connecticut, succeeding D. R. Fyler, deceased. Mr. Doolittle is an active Republican.

New York: Conditions of Making Refund Defined.

R. B. Rock v. the Delaware & Hudson. Opinion by Commissioner Decker.

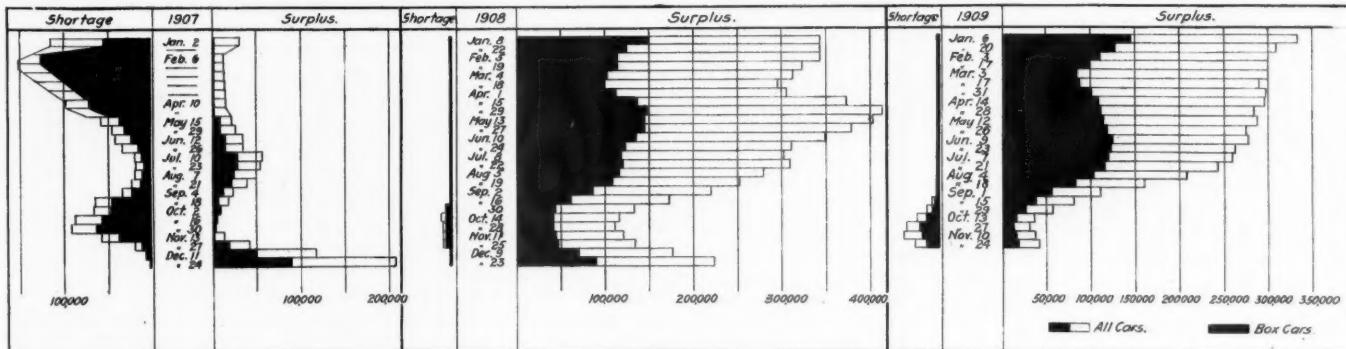
The commission is without power to issue orders requiring

CAR SURPLUSES AND SHORTAGES, JULY 22, 1908, TO NOVEMBER 24, 1909, INCLUSIVE.

Number of roads.	Surpluses.					Shortages.					
	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total	
November 24, 1909	163	17,538	4,091	5,628	12,271	39,528	12,230	891	9,542	4,833	27,496
November 10, 1909	171	16,107	3,622	6,536	10,351	36,616	21,386	1,956	11,730	4,830	30,902
October 27, 1909	174	18,029	3,090	5,287	9,490	30,896	23,138	1,412	8,743	3,343	36,636
September 29, 1909	174	22,330	3,821	11,239	15,998	53,388	8,184	655	4,392	1,351	14,552
August 18, 1909	169	82,505	5,953	42,158	28,808	159,424	556	277	1,076	100	2,000
July 21, 1909	165	116,221	9,971	78,675	38,487	243,354	106	169	31	33	339
June 23, 1909	166	121,441	12,099	89,292	40,112	262,944	211	190	193	233	827
May 26, 1909	158	118,077	14,940	97,006	43,687	273,710	83	99	1,011	47	1,246
April 28, 1909	161	107,665	16,487	110,538	47,638	282,328	144	106	74	173	497
March 31, 1909	158	101,344	20,428	128,546	46,282	296,600	158	98	116	27	391
February 17, 1909	159	98,512	23,924	135,208	43,797	301,441	266	97	11	96	470
January 20, 1909	162	127,204	26,723	116,680	41,057	311,664	163	21	189	35	358
December 23, 1908	158	87,350	16,247	79,595	38,885	222,077	471	42	289	217	1,019
November 25, 1908	160	45,194	12,157	43,854	31,624	132,829	1,923	178	900	209	9,210
October 28, 1908	158	39,383	10,185	31,541	29,803	110,912	8,175	167	2,261	236	10,839
September 30, 1908	160	42,593	10,365	49,795	31,039	133,792	7,813	450	224	127	8,114
August 19, 1908	160	106,367	13,494	92,500	40,842	253,003	465	90	105	194	854
July 22, 1908	166	120,580	14,401	125,739	47,960	308,680	115	37	330	27	509

with a decrease in the shortage of 12,406 cars. Box cars show a slight increase in surplus and a substantial decrease in shortage. In coal cars there is a slight decrease in the surplus and quite a large decrease in the shortage figures. The results for the country as a whole reflect quite fairly the situation in the various groups, with the exception of group 11

the payment by carriers of money damages by way of reparation for excessive charges on past shipments. However, in ordering rates to be reduced it has authority to declare its opinion that the complainant in a proper case is entitled to recover the difference between the rate charged on a past shipment which the commission has found unreasonable and



Car Surpluses and Shortages in 1907, 1908 and 1909.

(Canadian), where there is a decreased surplus and an increased shortage, the change being mainly in box cars."

The accompanying table gives the surpluses and shortages for the period covered by the report and the chart shows surpluses and shortages in 1907, 1908 and 1909.

INTERSTATE COMMERCE COMMISSION.

No Refund for Improper Delivery.

Crosby & Meyers v. Goodrich Transit Co. et al. Opinion by Commissioner Clark.

Carrier's agent unloaded into freight house a carload shipment which should have been delivered without additional

the rate which the commission finds to be reasonable and orders established for future shipments. In such a case if the carrier is unwilling to pay the money so found to be due by way of reparation the shipper can only recover by procedure in court, the right to recover for loss or damage through violation of the Public Service Commissions law being conferred by Section 40 of that statute. Where a carrier has voluntarily reduced a rate the shipper claims reparation and the carrier concedes that the excess charge above the new rate put in effect should be refunded, the commission treats the claim of the shipper or passenger and the reply of the carrier as complaint and answer with admission of liability and waiver of hearing on the part of the carrier. In such case if the commission finds that under all the cir-

cumstances the statute requires that the reparation should be made it will declare its opinion to that effect.

The following are the main restrictive considerations relating to rate reparations: Ordinarily the rate should have been reduced as the result of complaint to the carrier. The old rate should have been obviously too high or plainly out of line with other rates. The request for reparation should have been made to the carrier within a reasonable time after the high rate was applied to the shipment. The burden of the excessive charge must be shown to have been borne by the claimant. The claim, if sanctioned, must not take on any of the characteristics of a rebate. The carrier should state, in case of a voluntary reparation, that it has no intention to and sees no reason at the time for advancing the reduced rate in the near future.

A practice on the part of carriers to apply an excessive rate with knowledge and defer its reduction until some convenient time several months in the future and then apply for leave to make reparation on such old shipment cannot be tolerated. Such a practice makes reparation a part of rate making and disregards the requirement of the statute that rates shall be at all times on the basis of reasonableness and justice. In the particular case under consideration, in which complainant claimed a \$1 rate on 7,750 tons of ice from Glen Lake to Albany was unreasonable and should not have been charged more than 50 cents per ton, the testimony as submitted by the complainant is not sufficient to warrant a ruling that the \$1 rate was unreasonable; complainant did not attempt to proceed before the commission until three or four months after the shipments had moved and were delivered and in the meantime he had fixed his selling price with reference to the \$1 rate of which he complains and had sold a large part of the product at such price, thereby recouping himself from his customers for that part of the charge which he claims in this case to have been excessive.

Ohio: Claim for Loss of Freight.

Hisylvania Coal Co. v. Toledo & Ohio Central and Erie.

The complainant, a mine operator, alleges that on September 3, 1908, it shipped from Chauncey, Ohio, 63,000 lbs. of coal to the Alger Clay Manufacturing Co., at Alger, Ohio. At Alger the car contained but 46,530 lbs. of coal. The Alger company refused to accept the shipment on the terms previously agreed to, and it was shown that the shipment had in fact been made on approval. The complainant demanded that the railway companies concerned make good the loss of freight in transit and refund the freight charges for the 19,470 lbs. of coal lost. The company offered to refund the freight charges, but refused to make reparation for loss, claiming that the consignee and not the consignor should have put in the claim. The commission holds that this argument is not a valid one, since the shipment was made on approval. The coal company after some delay reweighed the carload in the presence of an agent designated by the railway companies, and it was found that the loss amounted to the number of tons which the complainant alleged were lost through negligence of the carrier. Evidence showed that the loss had occurred before the Erie received the shipment, and after taking testimony as to the facts the commission found that the Toledo & Ohio Central was responsible for the loss and ordered payment to be made accordingly.

COURT NEWS.

At Louisville, Ky., December 2, a special grand jury returned indictments against the Louisville & Nashville and the Louisville, Henderson & St. Louis Railroads and the American Tobacco Company for giving and receiving illegal rebates on freight during the past three years.

In the United States circuit court at Philadelphia December 2 the Fairmount & Baltimore Coal & Coke Co. entered suit against the Baltimore & Ohio Railroad for damages of \$100,000 in alleged discrimination in distributing coal cars; and another firm at the same time sued for \$75,000.

The Kansas City Southern has joined with other railways in asking the federal court at Guthrie, Okla., for an injunction

to restrain the officers of the state of Oklahoma from enforcing the 2-cent passenger fare provision of the state constitution and the various orders affecting freight rates that have been issued by the state corporation commission.

The appellate division of the supreme court of New York has affirmed a decision of the lower court, handed down some time ago, in favor of the trustees of Columbia College against the Interborough Rapid Transit Co., for damage to property of the college on Greenwich street, New York City, between Barclay street and Park place, because of the running of the Ninth avenue elevated trains in front of the building. For damages suffered hitherto and for future damages the aggregate award is about \$100,000. The college trustees had sued for an injunction, and the suit was contested by the railway company on the ground that the consents of the parties occupying the property, which had been obtained, absolved the road from paying more than a nominal sum (six cents) to the college.

Powers of New York Public Service Commission Defined.

The New York state court of appeals, in a decision handed down this week, holds that the Delaware & Hudson Company should not have been forbidden to issue about \$7,000,000 in bonds to pay indebtedness incurred by the purchase of the Hudson Valley Railway Company and certain undeveloped coal lands in Pennsylvania, and thereby sets a limit on the powers of the State Public Service Commission.

The court, in an opinion by Judge Haight, in which all the judges concur, holds that the paramount purpose of the public service law creating the commission was the protection and enforcement of the rights of the public; that the commission must simply see to it that railway corporations maintain their equipment, tracks and roadbeds in good order and operate their lines with safety to the public and give proper service; that they should also prevent fraud on the public through the manipulation of the stock market by reason of over-issue of stocks and bonds.

The legislature did not intend to make the commission the financial manager of corporations or empower it to substitute its judgment and discretion for that of the directors and stockholders of a corporation as to the wisdom of a transaction; that a statute that made such substitution would probably be unconstitutional, for the ownership of property carries with it the right of occupancy and management, and a statute that would deprive an owner of that right would undermine his right to protect and make his property remunerative.

The Public Service Commission, Second district, last December refused to authorize an issue of bonds by the D. & H. to pay off the \$4,665,295 of indebtedness incurred by the purchase of the securities of the Hudson Valley Company and \$2,500,000 for coal lands. The properties in question were not included in the mortgage on the Delaware & Hudson property under which it was proposed to issue these bonds. The property was acquired before the commission came into existence. The D. & H. appealed, the appellate division on September 30 set aside the order of the commission and the court of appeals now affirms the appellate division.

The decision says: For a generation or more the public has been frequently imposed upon by the issues of stocks and bonds of public service corporations for improper purposes, without actual consideration therefor, by company officers seeking to enrich themselves at the expense of innocent and confiding investors. One of the legislative purposes in the enactment of this statute was to correct this evil by enabling the commission to prevent the issue of such stock and bonds if upon an investigation of the facts it is found that they were not for the purposes of the corporation enumerated by the statute and reasonably required therefor.

In regard to the notes issued for the purpose of acquiring the stock and securities of the Hudson Valley Railway Company there is no question as to the amount or their validity. The learned commission, however, reaches the conclusion that notwithstanding the fact that the transaction was lawful and that the notes were the valid obligations of the corporation the purchase of the Hudson Valley securities was an unfortunate one for the company; that it paid for the securities more than they were worth, and that the property so acquired

REVENUES AND EXPENSES OF RAILWAYS.

has not been included in the mortgage. The commissioners consequently withheld their consent to the issuing of the bonds, but suggested that a mortgage might be executed by the United Traction Company (owned by the D. & H.), the present owner of the Hudson Valley Railway Company, upon the property acquired from that company for the retirement of such obligations.

This, we think, would be substituting the judgment and discretion of the commissioners for that of the directors and stockholders of the corporation. If such was the purpose and intent of the statute a doubt might arise with reference to its constitutionality. * * *

Assuming that the purchase was unfortunate and that the company has lost heavily thereby, still the commissioners concede that it was made at a time when no consent of the Railroad Commissioners or of the Public Service Commission was required, and that, therefore, the purchase was legal and one which the company had the right to make.

But if the property so acquired is of uncertain value and the road is unable to pay running expenses it might well be good judgment on the part of the Delaware & Hudson Company not to attempt to relieve itself from the burden of paying the notes by an attempt to issue mortgage bonds based on the security which that property affords.

The notes which the company had issued bear interest at a high rate. They were given for the acquisition of property, which is one of the four purposes designated by the statute for which bonds may be authorized to issue. Having been given for the acquiring of the property of another railway they are properly classified as capital and therefore brought within the express provisions of the statute under which the application was made. While, as we have stated, the ownership of property ordinarily carries with it the right of management, the duty devolves upon the owner to so manage as not to have it become a nuisance or unnecessarily infringe upon the rights of others.

It was therefore evidently the legislative intent in the enactment of this provision that the commissioners should have supervision over the issuing of long term bonds to the extent of determining whether they were issued under and in conformity with the provisions of the statute for the purposes mentioned therein; whether they were issued for the discharge of the actual and not the fictitious debts of the company or whether they were issued for the refunding of its actual obligations and not for the inflation of its stock or bonds.

Beyond this it appears to us that the power of the commissioners does not extend, unless it may pertain to the power to determine whether an obligation should be classified as operating expenses and as to whether such expenses should be paid by obligations running beyond a year.

We therefore conclude that as to the Hudson Valley securities, so called, the application should have been granted.

The notes issued in payment for the purchase of coal lands are also conceded to be valid obligations of the company. They were given for the acquisition of property. They are one year notes, bearing a high rate of interest and are obligations which it is desirable should be either paid or secured on long term bonds at a low rate of interest. These lands have been purchased for future mining operations, to be resorted to after the coal in the present mines of the company becomes exhausted. The lands so acquired or the amount paid therefor becomes the capital of the company.

The commissioners appear to have entertained the view that these lands should have been mortgaged for the purpose of paying the obligation. In that respect their judgment differs from that of the directors of the corporation. These lands at present are inaccessible for mining purposes. In order to make them available a railway 40 or 50 miles in length will have to be constructed. It is estimated that these lands will produce 400,000,000 tons of coal, but this is an estimate only.

Bonds issued upon such securities are not always as easily marketable as those upon well known railways earning annually a large surplus. However that may be we are of the opinion that the question presented is the same in this case as that which was presented with reference to the Hudson Valley securities, and that the application of the company should have been granted.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

S. Davies Warfield has been elected chairman of the executive committee of the Seaboard Air Line. N. S. Meldrum, of New York, formerly vice-president, has been elected president; Charles H. Hix, general manager at Portsmouth, Va., has been elected vice-president and general manager, and Charles R. Capps, freight traffic manager at Norfolk, has been elected vice-president in charge of traffic. L. G. Haas, formerly agent for the receivers at Portsmouth, has been appointed assistant to the president.

Mr. Hix, the new vice-president and general manager, was born in Nelson county, Va., in 1862, and began railway work in 1880 as rodman in the engineering corps of the Norfolk & Western. In the winter of 1881 he was made receiving and delivery clerk at Saltville and later became assistant agent and operator, leaving that position in 1884 to become agent at Buford. He was appointed relief agent in 1886 and two years later train despatcher at Roanoke and in 1891 chief despatcher. In 1897 he was appointed trainmaster of the Radford division and later, owing to a change in administration, he was again appointed chief despatcher, remaining



Charles H. Hix.

in that position until July, 1900, when he left that company to go to the Seaboard Air Line as trainmaster of the Second division, becoming trainmaster of the First division in June, 1901, and in September superintendent of the First division. In September, 1905, he was promoted to general superintendent, and in July, 1909, was made general manager, which position he held at the time of his recent appointment.

Mr. Capps, who has been elected vice-president, in charge of traffic, of the Seaboard Air Line at Norfolk, Va., was born March 4, 1871, at Norfolk, and was educated at Roanoke College.

He began railway work in the general freight and passenger agent's office of the Seaboard Air Line, serving in various clerical positions, including chief rate clerk and chief clerk. On July 12, 1895, he was appointed general freight agent of the Seaboard Air Line, and on the consolidation of the Seaboard Air Line, the Florida Central & Peninsula and the Georgia & Alabama in July, 1900, was appointed general freight agent of the consolidated company, the Seaboard Air Line Railway. He was appointed freight traffic manager in charge of freight traffic, industrial, mail and express departments of



C. R. Capps.

the Seaboard Air Line and subsidiary companies in July, 1909, which position he held at the time of his recent appointment. In July of this year Mr. Capps was also acting temporarily as traffic manager of the Baltimore Steam Packet Co.

A number of the official changes made on the Rock Island Lines and the St. Louis & San Francisco and its subsidiary lines, owing to the dissolution of the merger of these roads, were announced by the *Railroad Age Gazette* in its issue of December 3, 1909, page 1110. In addition to the changes there referred to the following have been made: H. I. Miller, president of the Chicago & Eastern Illinois and the Evansville & Terre Haute, with office at Chicago, has resigned, and B. L. Winchell, president of the St. Louis & San Francisco, has been elected president also of these roads to succeed him. W. J. Jackson, general manager of the Chicago & Eastern Illinois, has been elected vice-president and general manager. W. B. Biddle, third vice-president of all the Rock Island-Frisco Lines, has resigned from the Chicago, Rock Island & Pacific and the Chicago, Rock Island & El Paso, and retains the office of third vice-president of the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute. A. S. Greig, assistant to the chairman of the executive committee of the Rock Island-Frisco system, has resigned that office and has been elected vice-president and general purchasing agent of the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute, with office at St. Louis. R. A. Jackson, president of the Rock Island Company, first vice-president and general counsel of the Rock Island-Frisco system, has been elected first vice-president and general counsel of the Rock Island lines only. C. W. Hillard, fourth vice-president of the Rock Island lines, and vice-president and comptroller of the Frisco lines, has resigned the former office and will continue as vice-president and comptroller of the Frisco lines only. The following officers of the St. Louis & San Francisco were re-elected: C. R. Gray, vice-president; James Campbell, vice-president, and A. Douglas, vice-president and general auditor.

W. J. Jackson was born in 1859 at Toronto, Ont. He began

railway work in November, 1877, as machinist helper on the Grand Trunk, and from May, 1878, he was successively freight clerk with the Grand Trunk at Toronto; chief claim clerk, general freight foreman, assistant agent of the Chicago & Grand Trunk, now a part of the Grand Trunk Western, at Chicago; assistant and local freight agent, local agent of the Chicago & Eastern Illinois at Chicago. In July, 1899, he was appointed assistant general superintendent, and four years later was made general superintendent. He was appointed general man-

ager in November, 1906, which position he held until his recent election as vice-president and general manager.

William H. Langley, who has been elected vice-president of the Montana, Wyoming & Southern, is to have his office in New York.

The Camas Prairie Railroad Company has been organized for the purpose of taking over the operation of the Oregon, Washington & Idaho from Lewiston Junction, Wash., to Lewiston, Idaho, and the Northern Pacific from Lewiston, Idaho, to Grangeville, and the following officers have been elected: J. P. O'Brien, president, with office at Portland, Ore.; H. C. Nutt, vice-president, and M. P. Martin, treasurer, both with offices at Tacoma, Wash., and Charles E. McCulloch, secre-

tary, with office at Portland. R. Blaisdell has been appointed auditor, with office at Portland.

William Baxter Biddle, who has resigned as third vice-president of the Rock Island-Frisco Lines to become third vice-president only of the St. L. & S. F., the C. & E. I. and the E. & T. H., was born November 12, 1856, at Beloit, Wis. He was educated at Beloit and began railway work in 1878 as freight brakeman on the Atchison, Topeka & Santa Fe and was later station agent. In 1882 he was made chief clerk in the general freight office of the Atlantic & Pacific, now a part of the Santa Fe Coast Lines, and four years later he became assistant general freight agent. The next year he was made division freight and passenger agent, and in 1888 he was appointed assistant general freight agent of the Atchison, Topeka & Santa Fe. From 1890 to 1894 he was assistant freight traffic manager and later was made freight traffic manager. He was elected third vice-president of the Chicago, Rock Island & Pacific on March 1, 1905, and in January, 1906, his jurisdiction was extended over the St. Louis & San Francisco and the Chicago & Eastern Illinois

Alexander Simpson Greig, assistant to the chairman of the executive committee of the Chicago, Rock Island & Pacific at New York, has been elected vice-president and purchasing agent of the St. Louis & San Francisco. He

has also been elected vice-president and general purchasing agent of the Chicago & Eastern Illinois and the Evansville & Terre Haute. Mr. Greig was born October 25, 1866, in Aberdeen, Scotland. He received a common school education in Scotland and began railway work in 1885 on the Denver & Rio Grande, since which time he has been consecutively secretary to the purchasing agent, secretary to the superintendent of machinery, and was later transferred to the operating department as secre-

tary to the general superintendent, becoming chief clerk and then assistant to the general superintendent. In 1896 he was appointed trainmaster of the Santa Fe, Prescott & Phoenix, and two years later he was made superintendent of the El Paso & Northeastern, becoming general superintendent and traffic manager of the same road and finally assistant general manager, which position he held until March, 1903, when he left railway work and during the rest of that year was engaged in making plans for a new sanitarium in New Mexico. In January, 1904, he went to the Chicago, Rock Island & Pacific and performed special duties in the office of the president. Early in 1906 he was appointed assistant to the president of the St. Louis & San Francisco, and in June, 1907, was appointed assistant to chairman of the executive committee.



W. J. Jackson.



W. B. Biddle.



A. S. Greig.

C. W. Hillard, who has resigned his vice-presidency of the Chicago, Rock Island & Pacific, retaining the similar offices in the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute. This a natural result of the separation of control of these properties. As the financial officer of the combination Mr. Hillard has had strenuous years, and it is fair to say that he has measured fully up to the requirements. He has built up and maintained good credit for the corporations linked together on a defective business basis. He had no responsibility for that defect; but he had a plain duty and a highly difficult problem in financing. In his studies he has gone farther than this. As a statistician, he did not end with an assembling and presentation of facts. He always acquired full knowledge of their significance and he is one of the few men of this class whose opinions have great weight. It is interesting to recall the estimate made by the officer with whom Mr. Hillard began service as a clerk: "Hillard was a perfect clerk, a first-class bookkeeper, a good accountant. We do not expect great railway officers to come up in that path, but Hillard is a real financier and capable of a good deal more."

Mr. Hillard was born on June 9, 1855, in Northampton, England, and began railway work in 1876 as assistant secretary of the Chicago, St. Paul & Minneapolis, remaining in that position until the road was absorbed by the Chicago & North Western in December, 1882. In 1885 he became secretary and treasurer of the Chicago & Indiana Coal Railway, which was consolidated in 1887 with the Chicago & Eastern Illinois, when he became vice-president and treasurer of the combined company. In October, 1902, control of the Chicago & Eastern Illinois was secured by the St. Louis & San Francisco, and Mr. Hillard was made controller of the 'Frisco, in addition to his other duties, and on February 9, 1906, was elected also fourth vice-president of the Chicago, Rock Island & Pacific. In December, 1907, he was elected vice-president of the 'Frisco, resigning the duties of controller at that time, and in October, 1908, was elected also vice-president of the Evansville & Terre Haute.

James D. Elliott has been appointed general attorney of the Chicago, Milwaukee & St. Paul for North and South Dakota, with office at Aberdeen, S. D. Charles M. Stilwell has been appointed his assistant.

James E. Gorman, freight traffic manager of the Atchison, Topeka & Santa Fe at Chicago, has been elected vice-president in charge of the freight traffic department of the Chicago, Rock Island & Pacific, succeeding W. B. Biddle, resigned; Frank O. Melcher, general manager of the Rock Island lines east of the Missouri river at Chicago, has been elected vice-president in charge of the operating department, succeeding H. U. Mudge, elected president; John Sebastian, passenger traffic manager of the Rock Island-Frisco system at Chicago, has been elected vice-president in charge of the passenger department; and Edward S. Moore, second assistant to the president of the Rock Island, has been elected vice-president in charge of the purchasing department, succeeding E. L. Pollock; A. E. Sweet, assistant to the second vice-president of the Rock Island at Chicago, has been appointed assistant to the president, succeeding S. T. Fulton, resigned. All of the officers are to have headquarters at Chicago.

John Sebastian, passenger traffic manager of the Rock Island-Frisco system at Chicago, who has been elected vice-

president, in charge of the passenger department, began railway work in 1869 as a clerk on the Atchison, Topeka & Santa Fe, becoming later chief clerk and then traveling passenger agent. In 1880 he went to the Chicago, Rock Island & Pacific as general southwestern passenger agent, leaving that position seven years later to become general passenger ticket agent of the Chicago, Kansas & Nebraska, remaining there two years until the company was made a part of the Chicago, Rock Island & Pacific. He then was made general passenger agent of the Rock Island, and was appointed passenger traffic manager in March, 1902. The next year his authority was extended over the Choctaw, Oklahoma & Gulf, the St. Louis, Kansas City & Colorado and the Chicago, Rock Island & El Paso.

Frank O. Melcher, general manager of the Rock Island lines east of the Missouri river, at Chicago, who has been elected vice-president, in charge of the operating department, graduated from the academic department of Tuft's college in 1887 and immediately after graduation he began railway work with the Fitchburg in the engineering department, and remained with that company in various capacities until 1896, when he was appointed chief engineer. In the meantime he had received from Tuft's college in 1895 the additional degree of civil engineer. He was chief engineer of the road for two years and in 1898 was made general superintendent. In 1902 he went to the Rock Island as superintendent of the Iowa division



J. Sebastian.



F. O. Melcher.

and the following February was made general superintendent of the Choctaw district. In June, 1903, he was promoted from this position to general manager of the Central and Northern districts, with office at Chicago.

L. G. Haas, who has been appointed assistant to the president of the Seaboard Air Line, was born February 25, 1865, and educated at the Ohio State University. He began railway work in June, 1886, since which time he has been consecutively, up to December, 1887, chairman on construction work of the Cincinnati & Richmond, now part of the Pittsburgh, Cincinnati, Chicago & St. Louis. From December, 1887, to June of the following year he was assistant in the maintenance-of-way department of the Chicago, St. Louis & Pittsburgh at Logansport, Ind. He was appointed assistant engineer of the Cleveland & Pittsburgh, now belonging to the Pennsylvania Company, on June 1, 1888, at Wellsville, Ohio. From June 1, 1895, to November he was assistant engineer of the Newport & Cincinnati Bridge Co., at Cincinnati, becoming assistant engineer of the western division of the Pennsylvania Company November 1, 1895, at Fort Wayne. From June, 1896, to the following June he was engineer maintenance-of-way, on

the Toledo division, and from June, 1897, to November, 1899, he was on the Erie and Ashtabula divisions, at New Castle. From November 1, 1899, to June 1, 1901, he was superintendent of the same division and from June, 1901, to May, 1902, assistant to the general manager of the Baltimore & Ohio, becoming general superintendent of the Pittsburgh division of the same road in May. He was made assistant general manager of the Baltimore & Ohio in December, 1902, and left that company to become agent to the receivers of the Seaboard Air Line in February 16, 1908, which position he held at the time of his recent appointment.

Richard A. Jackson, president of the Rock Island Company, first vice-president and general solicitor of the Chicago, Rock Island & Pacific, vice-president of the Chicago & Eastern Illinois and the Evansville & Terre Haute and general counsel of the St. Louis & San Francisco, has been elected first vice-president and general counsel of the Chicago, Rock Island & Pacific lines only. Mr. Jackson was born September 5, 1858, at Richmond, Ind. He was educated at Earlham college, from 1872 to 1876, and at the University of Virginia from 1876 to 1879. Mr. Jackson's first railway work was in 1900 as general attorney of the Cincinnati, Richmond & Muncie, now part of the Chicago, Cincinnati & Louisville. From August, 1902, to 1904

he was general attorney of the Chicago, Rock Island & Pacific at Chicago. From 1904 to 1908 he was first vice-president and general solicitor of this road. In April, 1909, he was elected president of the Rock Island Co.

John C. Stuart, whose election as vice-president of the Erie Railroad and the New York, Susquehanna & Western, in charge of the operating departments of both these roads, at New York, was recently announced in these columns, was employed on the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha from 1880 to March 1, 1900. He was chief train despatcher on the west division of the Chicago & North Western from January, 1888, to June, 1890, when he became assistant superintendent of the same division, and two years later was appointed superintendent of the Galena division, which position he held until February, 1898, when he was made general superintendent of the Chicago, St. Paul, Minneapolis & Omaha. In March, 1900, he went to the Baltimore & Ohio as general superintendent of the Middle and Northwestern divisions, and in September, 1901, was appointed general superintendent transportation on the same road at Baltimore, Md., leaving that company January 1, 1903, to become general superintendent of the Erie at Cleveland, Ohio. The

following year he was appointed general manager of the same company, which position he held until his recent election as vice-president.

Operating Officers.

F. M. Jones, trainmaster of the Union Pacific at Denver, Colo., has been appointed assistant superintendent, with office at Denver, succeeding S. R. Toucey.

S. D. Freshman, assistant general manager, secretary and treasurer of the Sierra Railway of California at Jamestown, Cal., has been given the title of general manager.

J. H. Brinkerhoff, superintendent of the Rio Grande Junction Railway, with office at Grand Junction, Colo., has resigned to supervise the building of an electric railway in that vicinity.

H. J. Slifer, until recently general manager and assistant to the president of the Panama Railroad, has been appointed general manager of the Chicago Great Western, with office at Chicago.

G. B. Albright, general freight agent of the Chicago, Rock Island & Pacific at Kansas City, Mo., has been appointed general manager of the Union Stock Yards & Terminal Railway of Wichita, Kan.

The office of **J. W. Dean,** whose appointment as general superintendent of the Denver & Rio Grande has been announced in these columns, will be at Pueblo, Colo., instead of Denver, as previously stated.

F. N. Finch has been appointed superintendent and general freight and passenger agent of the Camas Prairie Railroad, with office at Lewiston, Idaho. See item under Executive, Financial and Legal Officers.

D. T. Murphy, assistant superintendent of the Duluth, Rainy Lake & Winnipeg at Virginia, Minn., has been appointed acting superintendent, with office at Virginia, succeeding M. A. Murphy, superintendent, resigned.

J. L. Terry, assistant treasurer and purchasing agent of the Denver, Laramie & Northwestern at Denver, Colo., has been appointed assistant to the general superintendent of the Denver & Rio Grande, with office at Denver.

A. Wilcox, superintendent of Division 3 of the Canadian Northern at Dauphin, Man., has been transferred to Division 1, with office at Port Arthur, Ont., succeeding M. A. Murphy, resigned. C. D. Fisher succeeds Mr. Wilcox.

O. J. Ogg, superintendent of the Utah lines of the Denver & Rio Grande at Helper, Utah, has been appointed superintendent of the Second and Third divisions of the Colorado lines, with office at Salida, Colo., succeeding R. R. Sutherland, resigned.

W. S. Polhemus, joint division superintendent of the Texas & Pacific and the Missouri, Kansas & Texas, with office at Ft. Worth, Tex., has resigned. G. B. Johnson, chief train despatcher at Ft. Worth, succeeds Mr. Polhemus, and Robert Cooke, chief clerk to the superintendent, succeeds Mr. Johnson.

J. G. Lorton, who was granted a leave of absence a few months ago, has resumed his duties as superintendent of the St. Louis & San Francisco, with office at Birmingham, Ala., succeeding S. H. Charles, acting superintendent. Mr. Charles has been appointed assistant superintendent, with office at Ft. Scott, Kan., succeeding A. J. Sams, resigned.

Traffic Officers.

N. D. Chapin has been appointed chief of the tariff bureau of the Michigan Central, with office at Detroit, Mich.

E. L. Mountfort has been appointed contracting freight agent of the Illinois Central, with office at Birmingham, Ala., succeeding E. B. Byers.

Robert F. Britton, rate clerk of the St. Louis Southwestern at Shreveport, La., has been appointed commercial agent, with office at Texarkana, Ark.

A. H. Heilbronner has been appointed a traveling passenger and freight agent of the San Pedro, Los Angeles & Salt Lake, with office at Butte, Mont.



R. A. Jackson.



John C. Stuart.

R. V. Swartsel has been appointed traveling freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Dayton, Ohio, succeeding T. P. Stabler, transferred.

J. W. White, agent of the Missouri, Kansas & Texas of Texas at Temple, Tex., has been appointed a commercial agent, with office at Denison, Tex., succeeding Paul Kirkpatrick, resigned to go into other business.

R. H. Carmichael, chief clerk in the office of the Southern Pacific at Galveston, Tex., has been appointed a general agent, with office at Mexico City, Mex., succeeding Charles Elkel, transferred.

J. J. Shelley has been appointed a contracting freight agent of the Chicago, Burlington & Quincy, with office at Kansas City, Mo., succeeding J. H. Compton, resigned to go with another company.

J. J. McCarty, traveling freight agent of the Louisville & Nashville at Detroit, Mich., has been appointed a traveling freight agent of the Atlanta, Birmingham & Atlantic, with office at Cincinnati, Ohio, succeeding Charles Patton, resigned to go with another company.

Amos S. Crane, assistant freight traffic manager and export freight traffic manager of the Boston & Maine, at Boston, Mass., has been appointed freight traffic manager, succeeding M. T. Donovan, deceased, and his former positions of assistant freight traffic manager and export freight traffic manager have been abolished.

F. C. Smith, traveling freight agent of the Louisville & Nashville at Cincinnati, Ohio, has been appointed general agent, with office at Pittsburgh, Pa., succeeding T. R. Barlow, resigned. John A. Hosty, soliciting agent at Cincinnati, succeeds Mr. Smith, and Fred Mulberry succeeds Mr. Hosty. M. C. Browning has been appointed traveling freight agent, with office at Detroit, Mich., succeeding J. J. McCarty, resigned.

T. M. Sloan, assistant general freight agent of the San Pedro, Los Angeles & Salt Lake at Los Angeles, Cal., has been appointed general freight agent, with office at Los Angeles, and the office of assistant general freight agent at that place is abolished. J. H. Manderfield, district freight agent at Salt Lake City, Utah, has been appointed assistant general freight and passenger agent, with office at Salt Lake City, and his former office is abolished.

Engineering and Rolling Stock Officers.

D. E. H. Manigault, division engineer of the Southern Pacific at Orendain, Jalisco, Mex., has resigned.

M. H. Haig has been appointed mechanical engineer of the Atchison, Topeka & Santa Fe, with office at Topeka, Kan.

W. J. Bennett, assistant superintendent of motive power of the Chicago, Indianapolis & Louisville, with office at Lafayette, Ind., has resigned.

J. J. Thomas, Jr., has been appointed superintendent of motive power and car equipment of the Mobile & Ohio, with office at Mobile, Ala., succeeding G. S. McKee, resigned.

Benjamin Johnson, formerly superintendent of motive power of the Mexican Central, has been appointed superintendent of motive power of the United Railways of Havana, with office at Havana, Cuba.

F. L. Allcott having resigned as engineer of tests of the Chicago, Milwaukee & St. Paul, J. F. De Voy, mechanical engineer, will assume charge of the testing department, in addition to his other duties.

OBITUARY.

Cyrus F. Sproul, superintendent of the Raritan River Railroad at South Amboy, N. J., was struck by a New York & Long Branch express at the South Amboy station December 1 and instantly killed. Mr. Sproul was 45 years of age and became superintendent of the Raritan River Railroad in 1908, previous to which time he was a civil engineer in the office of Earle & Harrison at Jersey City.

Railroad Construction.

New Incorporations, Surveys, Etc.

ABILENE & SOUTHERN.—An officer writes that surveys have been made from Abilene, Tex., southeast to Rising Star, 55 miles. (Oct. 8, p. 659.)

ALABAMA ROADS.—According to press reports, plans are being made to build a lumber road from Winfield, Ala., southwest via Columbus, Miss., the work to be finished within two years. The Interstate Lumber Co., of Columbus, which owns expensive timber lands in northeast Mississippi and northwest Alabama, is said to be interested. The incorporators include: J. M. Brown, A. E. Silverthorne and R. W. Watson, of Harrisburg, Pa., and C. F. Sherred, of Memphis.

ALBERTA CENTRAL.—Surveys are being made on 70 miles west from Red Deer, Alb. Smith & Johnston, solicitors, Ottawa, Ont. (March 19, p. 659.)

AMERICAN CENTRAL.—According to press reports plans have been made to build from Hoover, in Gray county, Tex., southeast through Gray, Wheeler and Collingsworth counties, Texas, and Greer and Jackson counties, Okla., thence to Vernon, Tex. M. F. Johnson and P. F. Reid, of Mobee, Wheeler county, are said to be interested.

ATCHISON, TOPEKA & SANTA FE.—This company has appropriated \$2,000,000 for double-tracking its line between Edelstein, Ill., and Knox. (Nov. 12, p. 942.)

BEAVER VALLEY & NORTHWESTERN.—An officer writes that surveys are being made and it is expected to begin construction work early in 1910 from Gage, Okla., to Hooker, 105 miles C. A. Holmes, secretary, Gage.

BIG BEND TRANSIT.—An officer writes that right-of-way has been secured for about 50 miles and considerable grading has been finished on this line. The company plans to build from Spokane, Wash., west along the Little Spokane river to Metre Rapids. William A. Nichols, president, 105 Howard street, Spokane. (March 19, p. 652.)

BIG HORN.—See Chicago, Burlington & Quincy.

BIRMINGHAM SOUTHERN.—This company has given a contract to Brewer & Jones, of Birmingham, Ala., and work is now under way from Wylam, Ala., to New Coal Mine, 3.3 miles. A further extension of eight miles is projected.

CANADIAN PACIFIC.—This company now has work under way as follows: Komarno, Man., north to Icelandic river, 29.2 miles; Virden, Man., northwest to McAulay, 14 miles; Regina, Sask., north to Craven, 23 miles; Kipp, Alb., to Carmanway, 28 miles; Langdon, Alb., to Acme, 38 miles, and Stettler, Alb., to Castor, 35 miles, a total of 167.2 miles.

An officer writes that the Northern Colonization is now in operation from Nomining, Que., north to Duhamel, 34.46 miles. (Nov. 19, p. 989.)

CENTRAL NEW ENGLAND.—An officer writes that during the year seven miles of new double-track were put in service between St. Elmo, N. Y., and Reynolds bridge, as well as two miles between Fishkill plains and Hopewell. Work is now under way on the construction of 10 miles of double-track between Fishkill plains and Poughkeepsie junction.

CHICAGO, AURORA & DE KALB.—An officer writes that work is now under way electrifying 30 miles of the line. (Sept. 17, p. 520.)

CHICAGO, BURLINGTON & QUINCY.—A contract has been given to the McArthur Brothers Co., of New York, for building 67 miles of the Big Horn railway from Shoshoni, Wyo., east to Powder river. This line will parallel the Chicago & North Western. The work involves the excavating of about 4,000,000 cu. yds. and will include some heavy steam shovel work, which will probably be carried out by the McArthur Brothers Co. Sub-contracts are let for 38 miles, and the remaining 29 miles will also be sublet at once. A force of about 800 men, 500 teams and five shovels will soon be at work on this sec-

tion. The cost of the line, which is expected to be finished by November, 1910, will be about \$1,000,000. (Dec. 3, p. 1106.)

According to press reports this company will build an extension from Sidney, Iowa, southeast to Riverton, also from Griswold west to Carson, completing a loop of the Red Oak-Riverton, Carson-Sidney and Red Oak-Griswold branches. The company is to operate an independent passenger service over this route.

CHICKASHA TERMINAL.—See Oklahoma Central.

COLORADO & CONCHO.—Incorporated in Texas, with \$500,000 capital, to build from Colorado, Tex., southeast via Robert Lee, in Coke county, to Tennyson, on the Kansas City, Mexico & Orient, about 60 miles. The incorporators include: C. W. McCutcheon, A. J. Russell, J. S. Burroughs, W. J. Adams, J. H. Warren and W. H. Bell.

COLORADO & MEXICO.—An officer writes that contract has been let and work is under way from Courtland, Ariz., to Gleason, six miles. Walter Douglas, president, Bisbee, Ariz.

CONCHO, SAN SABA & LLANO VALLEY.—This company, which was organized to build from Miles, Tex., southeast through Paint Rock to Brady and Llano, is said to have amended its charter. The projected route has been changed to permit building from Miles northwest to a connection with the Texico-Coleman cut-off of the Atchison, Topeka & Santa Fe in Lubbock county. The line is now in operation from Miles east to Paint Rock, 16.5 miles. R. A. Love, vice-president and general manager, Miles. (Sept. 24, p. 562.)

COPPER BELT.—It is expected to finish work on the first section from Wabuska, Nev., which is on the Southern Pacific, east to Mason City, 14 miles, by the middle of December. Contract for grading 10 miles additional south of Mason City has been let. W. C. Orem, general manager. (See Nevada Copper Belt, Oct. 15, p. 726.)

DENVER & RIO GRANDE.—See Montrose & Paradox.

GEORGIA & FLORIDA.—An officer writes that work is under way by M. M. Elkan, of Macon, Ga., from Normantown, Ga., north to Swainsboro, 20 miles. From that place the line is completed north to St. Clair. An extension is projected from St. Clair north about 28 miles to complete the line to Augusta. (Nov. 26, p. 1037.)

GRAND TRUNK PACIFIC.—An officer writes that work is under way by Foley, Welch & Stewart, of Story Plain, Alb., and Prince Rupert, B. C., from Wolf Creek, Alb., to Tete Jaune Cache, B. C., about 179 miles; also from Prince Rupert, B. C., east to Aldermere, about 235 miles, and by J. D. McArthur, of Winnipeg, Man., from Camrose, Alb., southerly on 24 miles. Surveys have been made from Tete Jaune Cache to Aldermere, about 516 miles. (Dec. 3, p. 1107.)

The Grand Trunk Pacific Branch Lines Co. will apply to the parliament of Canada at its next session for an act to authorize the construction of lines as follows: From a point on the Western division of the Grand Trunk Pacific near Watrous, Sask., to a point at or near Calgary, Alb., or to the line authorized to be built from a point on the Western division between 111 and 113 deg. of longitude to Calgary; from a point on the above line, within ranges four, five or six west of the third meridian, southeasterly and easterly to a point near Regina, Sask.; from a point on the first mentioned line, within ranges 21, 22, 23 or 24 west of the third meridian, northerly or northeasterly to a point at or near Biggar, Sask.

GREAT NORTHERN.—According to press reports from Seattle, Wash., surveys are about made for a line from Pateros, Wash., at the Junction of the Methow river with the Columbia, north, up the valley of the Methow to Twisp and to Winthrop, in Okanagan county, 65 miles; also for a line from Mansfield north to Bridgeport, in Douglas county.

GREAT SOUTHERN.—An officer writes that an extension is projected from Dufur, Ore., to Juniper Flats, 32 miles. (April 30, p. 963.)

HARRISON & MINERAL BELT.—This company has given a contract to the Southwest Construction Co., of Keener, Ark., and work is now under way building from Keener to Dodd City, 16 miles. T. A. Morton, chief engineer, Keener.

INTERNATIONAL TIMBER COMPANY'S ROAD.—This company, which recently finished one mile of line near Campbell River, B. C., has work under way on one mile additional and surveys made for two miles. Fred H. Parks, manager, Campbell River.

IOWA & SOUTHWESTERN.—Incorporated in Iowa, with \$300,000 capital and office at Clarinda, Iowa. The plans call for a line from Clarinda southwest via College springs to Blanchard, about 20 miles. The incorporators include: W. S. Farquhar, A. Taggart, J. A. McKinley, A. M. Abbott, J. N. Miller, C. M. Henn and T. E. Powers.

KANSAS NORTHWESTERN.—An officer writes that the projected route is from Wichita, Kan., to Bunkleman, Neb., 330 miles. The company expects to start surveys on the first section of 27 miles north from Great Bend, Kan., during December. W. R. Crompton, Great Bend, may be addressed.

KETTLE VALLEY LINES.—See Spokane & British Columbia.

LONG ISLAND.—An officer says that the following is substantially correct: Before the end of 1909 the electrification of 40 miles, on which work was begun this year, will be finished and over 140 miles of railway will be ready for the operation of electric cars. It is expected that by June 1, 1910, the lines will be in full operation and work well advanced on the electrification and double-tracking of the entire North Shore division from Winfield Junction to Flushing, Whitestone, Malba and Whitestone Landing, as well as from Whitestone Junction to Port Washington. A site has been secured at Winfield for a large sub-station to supply power for this division, and it is expected before the end of the summer of 1910 that the company will be carrying passengers from the entire North Shore territory direct to the Borough of Manhattan. (Nov. 19, p. 991.)

MALHEUR VALLEY.—See Oregon Short Line.

MEXICAN SOUTHERN.—An officer writes that work is under way on a branch from San Pablo, Huixtepec, in Oaxaca, Mex., to San Juan, Taviche, 16 miles, also from Tule to Tlacolula and to Magdalena, 19 miles. (Aug. 13, p. 297.)

MEXICO NORTHWESTERN.—An officer writes that contract has been let to R. M. Dudley, of Chihuahua, to build 116 miles, connecting the northern line at Terrazas, Mex., with the southern line at Madera. (Nov. 26, p. 1037.)

MINIDOKA & SOUTHWESTERN.—See Oregon Short Line.

MONTCROSE & PARADOX.—According to press reports from Montrose, Colo., surveys are being made for a 90-mile line. Construction work is to be started early next year. Local capital is back of the project, and it is said that on completion of the work the road will be bought by the Denver & Rio Grande.

NEW IBERIA, ST. MARTIN'S & NORTHERN.—An officer writes that work is under way by P. M. Johnston, Son & Allhands, of St. Elmo, Ill., building from Port Barre, La., southeast to New Iberia, 48 miles, following the west side of the Bayou Teche and crossing that stream about seven miles from New Iberia. Sub-contract let to the Jewett Construction Co., of Springfield, Mo., for the bridges and buildings on the line. There will be one 140-ft. steel draw span, which is being put up by the Wisconsin Bridge & Iron Co. R. J. Lockwood, chief engineer, New Iberia. (Oct. 1, p. 613.)

NEW MEXICO CENTRAL.—An officer writes that this company, formerly the Santa Fe Central, has given a contract to the Dominion Construction Co., of Pittsburgh, Pa., for an extension from Moriarty, N. Mex., west to Albuquerque, 45 miles, also from Frost to Hagan, 15 miles. (Oct. 29, p. 828.)

NEW YORK CONNECTING.—See Pennsylvania.

NORTHERN COLONIZATION.—See Canadian Pacific.

NORTH MISSOURI CENTRAL.—An officer writes that the projected route is from Mexico, Mo., southwest to Columbia, thence south to Jefferson City, 64 miles, and surveys are now being made. A. J. Estes, secretary and treasurer, Columbia. (Jan. 8, p. 89.)

OKLAHOMA CENTRAL.—An officer of the Chickasha Terminal writes that the company will proceed with the work of build-

ing a terminal system around Chickasha, Okla., to include a station to cost \$25,000. Contracts are not yet let, but it is expected to begin work soon. Traffic arrangements have been made between the terminal company and the receiver of the Oklahoma Central, which will eventually become owners of the line. H. H. Fitzgerald, chief engineer, Purcell. (Dec. 3, p. 1107.)

OKLAHOMA, RED RIVER & TEXAS.—Incorporated in Texas, with office at Clarksville, Tex. The plans call for a line from Blossom, Tex., south to Mineola, 80 miles. The incorporators include: C. P. Moore, F. Miesch, J. T. Brown and R. Johnson.

OREGON ELECTRIC.—An officer writes that a contract has been given to F. Robertson, of Portland, Ore., for work from West Woodburn, Ore., to Woodburn, three miles. (Nov. 26, p. 1038.)

OREGON RAILROAD & NAVIGATION.—This company will lay 25 passing tracks on the main line to cost \$250,000, including cost of automatic signals. The passing tracks will have a length of about 3,000 ft. each, or a total of about 14 miles. An officer writes there is no truth in the report that the main line is to be double-tracked between Huntington, Ore., and Portland.

OREGON SHORT LINE.—An officer writes that work is under way by the Utah Construction Co., of Ogden, Utah, on an extension of the Malheur Valley (Willow Creek branch) from Vale, Ore., northwest to Brogan, 23.8 miles. (Sept. 10, p. 478.)

The Salmon River (Aberdeen branch) is being built from Moreland, Idaho, southwest to Aberdeen, 28.8 miles. (July 16, p. 125.)

The Minidoka & Southwestern (North Side branch) is under construction from Rupert, Idaho, west to Bliss, 72.4 miles, and the Oakley branch from Burley south to Oakley, 21.8 miles. (Aug. 27, p. 383.)

OTTAWA, MONTREAL & EASTERN.—Application will be made for a charter to build from Lake Megantic, in Compton county, Que., to a crossing of the St. Lawrence river at Longueuil. Permission is also to be asked to build a combined railway and highway bridge over the St. Lawrence river, or to construct a tunnel under the river at that place. The line will continue westerly to the Ottawa river in Argenteuil county, thence through the province of Ontario to the city of Ottawa.

PENNSYLVANIA.—Bids are wanted for relocating the line through Bristol, Pa., on which work is to be started as soon as contracts are let, and the work will be completed in about one year. The present line is on a heavy curve through the center of the city and the relocation will be on a straight line through the western part of the city, eliminating two curves, one of 1 deg. 20 min. and the other of 1 deg. 40 min. The new line will be located about one-half mile west of the present station in Bristol. It will be two and one-quarter miles long and have four tracks. The maximum curvature will be 45 min., and the total curvature will be 50 deg. 8 min., as compared with 101 deg. 22 min. on the present line. The improvements will eliminate 10 grade crossings. Nine bridges are to be built over streets and public roads, one over the Pennsylvania canal and three over streams. The work will require the grading of 550,000 cu. yds. of earth, constructing 5,000 cu. yds. of arch masonry, and 12,000 cu. yds. of bridge masonry.

An agreement is said to have been reached between this company and the New York, New Haven & Hartford for carrying out work on the New York Connecting Railway. The projected route is from the Morris Park yards of the N. Y., N. H. & H. in the Borough of the Bronx, and the work calls for the construction of a large viaduct over Ward's and Randall's Islands and bridges over the Harlem and East rivers, thence through the Boroughs of Queens and Brooklyn to Bay Ridge. Contracts for the bridges are to be let early next year. (March 19, p. 657.)

PANAMA RAILROAD.—An officer writes that this company has work under way relocating the line between Gatun, Canal Zone, Panama, and Gamboa, 24 miles; also between Paraíso and Corozal, 4½ miles, and has projected similar work between Corozal and Balboa.

ST. LOUIS & HOUSTON MINERAL BELT.—An officer writes that surveys are being made from Houston, Mo., to Sargent, 23 miles. E. K. Lyles, secretary, Houston.

ST. LOUIS, BARTELSVILLE & PACIFIC.—An officer writes that this company has located the line from Joplin, Mo., west to Carmen, Okla., 225 miles. D. H. Rhodes, chief engineer, 213 Fourth street, Joplin. (March 19, p. 657.)

SALMON RIVER.—See Oregon Short Line.

SAN DIEGO, EL PASO & ST. LOUIS.—An officer writes that surveys have been made from El Paso, Tex., east to Artesia, N. Mex., 197 miles. The line is projected east from Artesia to the Red river, in Texas, 325 miles. P. A. McCarthy, Houston, Tex., may be addressed. (Oct. 8, p. 662.)

SANDY RIVER & RANGELEY LAKES.—An officer writes that this company has projected an extension of 5.75 miles in Maine, to be known as the Madrid extension.

SOUTHWESTERN.—An officer writes that an extension has been located and grading contracts will be let at once. The projected route is from Scotland, Tex., southwest to Archer City, about 10 miles. It is expected to have the line in operation by March, 1910.

SPOKANE & BRITISH COLUMBIA.—An officer of the Kettle Valley Lines writes that an agreement has been made between this company and the province of British Columbia whereby the railway will build a line from Midway, B. C., to Penticton. The agreement provides that the province will subsidize the extension from Penticton to a connection with the Nicola, Kamloops & Similkameen at or near Nicola, not to exceed 150 miles. A line is also to be built from Grand Forks, B. C., to the north fork of the Kettle river for about 30 miles. (Dec. 3, p. 1109.)

TAMPA NORTHERN.—This company will probably build in the near future an extension of about 35 miles from Dunnellon, Fla. The company asked bids in September for work on about 37 miles from Brooksville, Fla., north to Dunnellon. (Sept. 17, p. 521.)

TEXAS CENTRAL.—An officer writes that this company has had under consideration for a long time the question of building a branch from De Leon, Tex., westerly through Comanche, Eastland, Callahan, Taylor and Nolan counties, as well as an extension of the main line from the present terminus at Rotan, westerly to or near the New Mexico state line. Nothing has been done and surveys have just been started. Preliminary surveys are being made from Rotan over about 100 miles to find a route to reach the top of the plains, and preliminary survey is also being made from De Leon. It is expected to begin construction work on the latter during December.

TITUSVILLE CENTRAL.—Incorporated in Pennsylvania, with \$210,000 capital, to build from Titusville, Pa., north to Corry, 20 miles. W. J. Smith is president.

TONOPAH & TIDEWATER.—According to press reports from Los Angeles, Cal., this company has projected extensions to connect its southern terminus with Los Angeles, and from its northern end via Ely, Nev., to Salt Lake City, Utah. The Utah & Nevada, recently incorporated, is to carry out the northern end of the work. The incorporators include: I. W. Ayres, of Oakland; C. W. Scofield, J. S. Sterling and H. G. Fritz, all of New York. (See Utah & Nevada under date of Nov. 26, p. 1038.) The Ely & Goldfield has recently been organized to build a line over a section of this route.

UTAH & NEVADA.—See Tonopah & Tidewater.

VEEBLEN & NORTHWESTERN.—An officer writes that all surveys have been made for the main line from Veblen, S. Dak., east to a point near Wheaton, Minn., 38 miles, and right-of-way has been secured. It is expected to begin construction work early in 1910. W. J. Hawley, Watertown, S. Dak., may be addressed.

WESTERN MARYLAND.—According to press reports, this company is planning to build an extension from Cumberland, Md., northwest to Newhaven, Pa., for which funds, it is said, have already been provided.

WINNSBORO & BOEUF RIVER.—Incorporated in Louisiana to build from Winnsboro, La., northeast to Boeuf river. The line is to be built by the St. John Lumber Co. It is the intention to ultimately extend the line to Jena. About six miles have been graded.

Railroad Financial News.

ATLANTIC & WEST POINT.—Stockholders are to vote December 14 on the question of retiring or refunding the \$1,232,200 6 per cent. certificates of indebtedness (subject to call at the company's option) and also on the question of increasing the stock. There is now outstanding \$1,232,200 stock, on which 6 per cent. annual dividends are being paid.

CHICAGO, CINCINNATI & LOUISVILLE.—The receiver has sold to a syndicate headed by Newman Erb \$1,360,000 of a new issue of 5 per cent. receiver's certificates, which is part of \$1,400,000 authorized November 8. The outstanding \$1,000,000 6 per cent. receiver's certificates authorized in May, 1908, have been called for payment at par on January 1.

CHICAGO GREAT WESTERN.—The formal order discharging the receivers has been handed down by the United States circuit court, and the company has filed its new mortgage for \$75,000,000 authorized by the reorganization plan. (June 18, p. 1330.)

CHICAGO, ROCK ISLAND & PACIFIC.—The entire outstanding issue of \$17,364,180 5 per cent. collateral trust bonds dated 1908, due 1913 but callable for redemption at 102½, have been called for redemption on February 1, 1910. The bonds are secured by a majority of the common stock of the St. Louis & San Francisco, which stock has been sold by the C. R. I. & P. to the Yoakum-Hawley interests.

See St. Louis, Brownsville & Mexico and Lehigh Valley.

CHICAGO SUBWAY.—Default in interest due December 1 on the Chicago Subway first lien bonds and on the first mortgage bonds of the Illinois Tunnel Co. has been made. D. R. Forgan and Charles G. Dawes have been appointed receivers of the Illinois Tunnel Co., and E. A. Potter has been appointed receiver of the Chicago, Warehouse & Terminal Co. There had been issued up to July 31 \$15,842,000 first lien Subway bonds in exchange for an equal amount of the Tunnel first mortgage 5 per cent. bonds. Previous to this there were \$17,000,000 Tunnel bonds outstanding. A further amount of Subway bonds were reserved to replace \$13,000,000 Illinois Tunnel bonds deposited as security for \$9,500,000 floating debt. The present unfunded obligations are said to be something more than \$10,000,000. The *Commercial and Financial Chronicle* says: "The enterprise was being carried through its initial stages by advances from J. Ogden Armour and E. H. Harriman, but after the death of Mr. Harriman the Harriman estate withdrew its support, making reorganization necessary if outside assistance is to be obtained. Some \$5,000,000 or more new money, it is said, is required to place the property in condition to be operated profitably."

Holders of the majority of all classes of securities of the Illinois Tunnel Co., the Chicago Warehouse Co. and the Chicago Subway have elected William S. Todd, Henry W. de Forest and L. C. Krauthoff as a reorganization committee.

DELAWARE & HUDSON.—See an item in regard to this company in Court News.

DELAWARE, LACKAWANNA & WESTERN.—On December 2 the directors declared an extra annual dividend of 10 per cent., payable December 22. An extra dividend of 10 per cent. has been declared in each of the last five years, but this year, in view of the special cash dividend of 50 per cent. paid last July and the special 15 per cent. stock dividend paid in August, there was some doubt as to whether the regular extra dividend would be declared. Rumors say that a dividend at the annual rate of 10 per cent. will probably shortly be declared on the stock of the Delaware, Lackawanna & Western Coal Co.

DETROIT, TOLEDO & IRONTON.—The protective committee representing the holders of the Detroit Southern, Ohio Southern division, bonds, on which interest was defaulted last September, has issued a circular saying that they are informed that receiver's certificates are to be issued with a lien on the property prior to that of the Detroit Southern bonds, and the committee urges bondholders to deposit their hold-

ings without delay with the Central Trust Co., New York, under the agreement of Nov. 8. Bonds will be received until December 17.

GRAND TRUNK PACIFIC.—See an item in regard to this company in General News.

LEHIGH VALLEY.—At the annual meeting of stockholders on January 18 the board will be asked to elect William H. Moore, D. G. Reid and E. S. Moore directors, to succeed three directors who are to resign. W. H. Moore and Mr. Reid will also become members of the executive and of the finance committees. Mr. Reid has been newly elected chairman of the executive committee of the Chicago, Rock Island & Pacific and the Moores are closely identified with the control of the C. R. I. & P.

MOBILE, JACKSON & KANSAS CITY.—See New Orleans, Mobile & Chicago.

NEW ORLEANS, MOBILE & CHICAGO.—G. W. Crary, W. L. O'Dwyer, H. M. Wood and H. S. Ricker have been elected directors of this new company, which has an authorized capital stock of \$15,000,000 and which is to take over the property of the Mobile, Jackson & Kansas City.

NORFOLK & SOUTHERN.—The property of this company was sold on December 7 under foreclosure of the first and refunding mortgage. Rathbone Gardner, representing the reorganization committee, bought the property for \$8,500,000.

ST. LOUIS & SAN FRANCISCO.—The sale of the majority stock of this company by the Chicago, Rock Island & Pacific to B. F. Yoakum, Edwin Hawley and associates, mentioned in these columns last week, was understood to have been at a price considerably below (rumors say \$7,000,000) the price paid by the C. R. I. & P.

See St. Louis, Brownsville & Mexico.

ST. LOUIS, BROWNSVILLE & MEXICO.—Control of this company, it is understood, has been sold to the St. Louis & San Francisco.

ST. LOUIS SOUTHWESTERN.—A semi-annual dividend of 2½ per cent. has been declared payable January 15 on the preferred stock. This places the stock on a 5 per cent. annual basis. Six months ago an initial dividend of 2 per cent. was declared. The stock is a 5 per cent. non-cumulative preferred stock.

SEABOARD AIR LINE.—The following have been elected as an executive committee: S. Davies Warfield, chairman; John Skelton Williams, Franklin Q. Brown, James A. Blair, Ernst Thalmann, C. Sidney Shepard, W. B. Donhan, L. F. Loree and B. F. Yoakum.

THIRD AVENUE (NEW YORK).—The reorganization committee, J. N. Wallace, chairman, has submitted to the New York Public Service Commission, Second district, another reorganization plan to replace the plan rejected by the commission some little time ago. The obligations of the old company, exclusive of \$5,000,000 first mortgage bonds which will remain an obligation of the new company, were \$7,200,000 prior claims, \$41,888,737 in principal and interest on consolidated mortgage bonds and \$16,000,000 stock, a total of \$65,088,737. Exclusive of the \$5,000,000 first mortgage bonds the obligations of the new company will be \$15,790,000 in first refunding mortgage 4 per cent. bonds due in 1960, \$22,536,000 fifty-year 5 per cent. income bonds and \$16,590,000 stock, a total of \$54,916,000. The reduction in capitalization thus amounts to \$10,172,737. Fixed charges of the old company amounted to \$1,752,400 per annum; according to the new plan the annual fixed charges will be \$870,800. Stockholders are to be assessed \$45 per share.

WASHINGTON, POTOMAC & CHESAPEAKE.—The United States circuit court, an application of the trustees for the mortgage bonds, has ordered the sale under foreclosure of the Washington, Potomac & Chesapeake, which runs from Brandywine, Md., to Mechanicsville, 21 miles.

WESTERN MARYLAND.—The new board of directors of the reorganized company are as follows: B. F. Bush, H. C. Cooper, F. T. Gates, George J. Gould, A. W. Krech, E. L. Marsten, Winslow S. Pierce, W. A. Wilber and Alexander Robinson..

Late News.

The items in this column were received after the classified departments were closed.

A number of Missouri capitalists, including Harold K. Knight, of St. Louis, Mo., are planning to build an electric line from Greeley, Colo., to Denver.

R. R. Baker has been appointed acting superintendent of signals of the Rock Island lines, with jurisdiction over the Nebraska and Colorado divisions, with office at Lincoln, Neb.

T. A. Dugan has been appointed general freight agent of the St. Johnsbury & Lake Champlain, also of the York Harbor & Beach, with office at Boston, Mass., succeeding M. T. Donovan, deceased.

It is estimated that the United States Steel Corporation will probably show an unfilled tonnage of nearly 6,500,000 tons as of December 31, 1909. At the close of 1908 the unfilled tonnage amounted to 3,602,527 tons.

W. C. Schults has been appointed trainmaster and R. H. Ingram acting chief despatcher of the Third and Fourth districts of the Western Pacific, between Oroville, Cal., and Gerlitz, with office at Portola, Cal.

The Chicago Great Western has ordered 200 fifty-ton steel general service cars, 200 forty-ton flat cars and 20 cabooses from the American Car & Foundry Co., and 20 cinder cars from the Hicks Locomotive & Car Works.

The Spokane, Portland & Seattle is said to be planning to build a branch from Hooper, Wash., southeasterly to the Paluse river, following that stream, thence through the La Crosse country to Colfax and to Pullman.

Charles S. Holt, representing the Chicago Terminal minority common stockholders, has asked the appointment of another receiver because he claims that Receiver Faithorn is identified with Baltimore & Ohio interests.

The Charleston & Western Carolina is said to have plans made for improvements, to include a new station at Greenville, S. C., on which work is to be started early next year. The cost of the improvements will be about \$150,000.

The Kansas City, Mexico & Orient is said to have decided to build a branch from San Angelo, south to a connection with the Mexican International at Allende, Coahuila, Mex., about 200 miles. The work will include putting up a bridge over the Rio Grande at Del Rio.

Under the name of the Brownwood North & South, a charter will be asked for in Texas to build about 30 miles of line. Surveys will be made at once. The line will eventually run to May, Tex., and to Rising Star. The directors include: J. A. Walker, G. N. Harrison, T. C. Yantis, R. B. Rogers and W. H. Mayes. The offices are at Brownwood.

Work is said to have been finished by the Degnan Contracting Co. on the section from Pearl to Canal streets, in the borough of Manhattan, as well as a spur from the loop in Center street to the Manhattan bridge approach. This is part of the four-track subway loop being built to connect the Brooklyn and Williamsburg bridges in the borough of Manhattan.

L. M. Allen, general passenger agent of the Chicago, Rock Island & Pacific at Chicago, has been appointed passenger traffic manager, succeeding John Sebastian, elected vice-president. W. J. Leahy, first assistant general passenger agent at Chicago, succeeds Mr. Allen. J. A. Stewart, assistant general passenger agent at Kansas City, Mo., succeeds Mr. Leahy, all with offices at Chicago.

W. S. Tinsman, manager of the Southern and Choctaw districts of the Chicago, Rock Island & Pacific at El Reno, Okla., has been appointed general manager, with office at Chicago, succeeding F. O. Melcher, elected vice-president. W. M. Whitenton, general superintendent of the Choctaw district at Little Rock, Ark., has been transferred to the Central district, with office at Davenport, Iowa, succeeding H. S. Cable, resigned. J. B. Smalley, superintendent at Rock Island, Ill.,

has been appointed general superintendent of the Southwestern district, with office at Topeka, Kan., succeeding C. W. Jones.

All but 1,200 sq. ft. of main floor space out of a total available of 32,517 sq. ft. has been taken by exhibitors at the Coliseum for the Railway Appliance exhibition, to be held March 14 to 19, 1910, in connection with the annual convention of the American Railway Engineering and Maintenance of Way Association at Chicago. It will therefore be necessary to use the annex and the balcony. The following is a list of the exhibitors:

Adams & Westlake Co., Chicago.
Allith Manufacturing Co., Chicago.
Ames, Cortlandt F., Chicago.
American Concrete Co., Chicago.
American Guard Rail Fastener Co., Philadelphia, Pa.
American Hoist & Derrick Co., St. Paul, Minn.
American Locomotive Co., New York.
American Rolling Mill Co., Middletown, Ohio.
American Railway Signal Co., Cleveland, Ohio.
American Steel & Wire Co., Chicago.
American Valve & Meter Co., Cincinnati, Ohio.
American Well Works, Aurora, Ill.
Armspear Mfg. Co., New York.
Asphalt Ready Roofing Co., New York.
Barrett Manufacturing Co., New York.
Beaver Dam Malleable Iron Co., Beaver Dam, Wis.
Bird, J. A. & W., Co., Boston, Mass.
Bryant Zinc Company, Chicago.
Buda Foundry & Manufacturing Co., Chicago.
Card & McArdle, Waukegan, Ill.
Carnegie Steel Co., Pittsburgh, Pa.
Cleveland Frog & Crossing Co., Cleveland, Ohio.
Conley Frog & Switch Co., Memphis, Tenn.
Cook's Standard Tool Co., Kalamazoo, Mich.
Crerar, Adams & Co., Chicago.
Detroit Graphite Co., Detroit, Mich.
Dunton Manufacturing Co., Chicago.
Eastern Granite Roofing Co., New York.
Eugene Dietzgen Co., Chicago.
Dickinson, Paul, Inc., Chicago.
Dilworth, Porter & Co., Ltd., Pittsburgh, Pa.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Edison Manufacturing Co., Orange, N. J.
Electric Storage Battery Co., Philadelphia, Pa.
Elyria Iron & Steel Co., Elyria, Ohio.
Fairbanks, Morse & Co., Chicago.
Forsyth Steel Tie Co., Pittsburgh, Pa.
Franklin Manufacturing Co., Franklin, Pa.
Frank M. Foster, Columbus, Ohio.
General Railway Signal Co., Rochester, N. Y.
Gray, Peter & Sons, Inc., Boston, Mass.
Greenlee Bros., Chicago.
Grip Nut Co., Chicago.
Hall Signal Co., New York.
Handlan Buck Manufacturing Co., St. Louis, Mo.
Hayes Track Appliance Co., Geneva, N. Y.
Heath & Milligan Mfg. Co., Chicago.
Interlocking Nut & Bolt Co., Pittsburgh, Pa.
Johns-Manville Co., H. W., New York.
Joyce Cridland Co., Dayton, Ohio.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Kenly, W. K., Co., Chicago.
Kennicott Water Softener Co., Chicago Heights, Ill.
Kerite Insulated Wire & Cable Co., New York.
Keuffel & Esser Co., Hoboken, N. J.
Keystone Driller Co., Beaver Falls, Pa.
Lackawanna Steel Co., New York.
Link Belt Co., Philadelphia, Pa.
Lufkin Rule Co., Saginaw, Mich.
Lupton, David, & Sons, Philadelphia, Pa.
Lutz-Lockwood Co., Aldene, N. J.
Mackenzie Klink Mfg. Co., Chicago.
Mann, O. C., Chicago.
Matthews, W. N., & Bros., St. Louis, Mo.
Miracle Pressed Stone Co., Minneapolis, Minn.
Morden Frog & Crossing Works, Chicago.
Municipal Engineering & Contracting Co., Chicago.
National Lock Washer Co., Newark, N. J.
National Malleable Castings Co., Cleveland, Ohio.
Nichols, Geo. P., & Bros., Chicago.
Otto Gas Engine Works, Chicago.
Pease, C. F., Blue Print Machinery & Supply Co., Chicago.
Pennsylvania Steel Co., Steelton, Pa.
Pocket List of Railway Officials, New York.
Post Mold Co., D. & A., Three Rivers, Mich.
Q. & C. Company, New York.
Rail Joint Co., New York.
RAILROAD AGE GAZETTE, New York.
Railroad Supply Co., Chicago.
Railway & Engineering Review, Chicago.
Railway Chemical Sprayer Co., Owensboro, Ky.
Railway List Co., Chicago.
Railway Specialty & Supply Co., Chicago.
Ramapo Iron Works, Hillburn, N. Y.
Roberts & Schaefer Co., Chicago.
Scherzer Rolling Lift Bridge Co., Chicago.
Sellers Manufacturing Co., Chicago.
Simmons Hardware Co., St. Louis.
Spencer Otis Co., Chicago.
Strauss Bascule & Concrete Bridge Co., Chicago.
Strobel Steel Construction Co., Chicago.
Templeton Kenly Co., Chicago.
U. S. Wind Engine & Pump Co., Batavia, Ill.
U. S. Metal & Mfg. Co., New York.
Union Switch & Signal Co., New York.
Whall, C. H., & Co., Boston, Mass.
Wharton, Wm., Jr., & Co., Philadelphia, Pa.
Williams, White & Co., Moline, Ill.
Winans Improved Patent Rail Joint Co., Portland, Ore.
Winters-Coleman Scale Co., Springfield, Ohio.
W. W. Patterson Co., Pittsburgh, Pa.

Supply Trade Section.

On December 7, 600 boiler makers at the Schenectady plant of the American Locomotive Co., New York, went on strike because of the distribution of work by order.

Frank L. Alcott, for 27 years in the construction department of the Chicago, Milwaukee & St. Paul in Milwaukee, Wis., has resigned and is now connected with the Buckeye Steel Castings Co., Columbus, Ohio.

The Pullman Company, Chicago, has made plans to build a plant at Detroit, Mich. The company has filed articles of incorporation in Michigan, to include not only the new plant, but all the company's Michigan business.

G. E. Ellis has become vice-president of the Hayes Track Appliance Co., Geneva, N. Y. Mr. Ellis was formerly signal engineer of the Rock Island, and more recently has been manager of installation for the Federal Signal Co., Albany, N. Y.

The London firm of J. S. Morgan & Co. will be known after January 1 as Morgan, Grenfell & Co., the membership being changed to include all the partners of J. P. Morgan & Co., New York, and Drexel & Co., Philadelphia. Mr. Grenfell is one of the managers of the Bank of England.

The Robins Conveying Belt Co., Passaic, N. J., and the Robins New Conveyor Co. have been consolidated. Thomas Robins is to be president of the consolidated company and C. Kemble Baldwin its chief engineer. The company will have offices in the Old Colony building, Chicago.

Jas. H. Oliphant & Co., New York, have opened an office for a general investment and brokerage business in the Rookery, Chicago, under the management of John Jay Bryant, Jr., formerly secretary of the Farwell Trust Company, Chicago. This office is connected by private wire with their New York office.

The Climax Manufacturing Co., Corry, Pa., has appointed the Railway Equipment Co., Portland, Ore., selling agent for the new improved Climax geared locomotive in Oregon, northern California, and that section in Washington tributary to the Columbia river. The Railway Equipment Co. is taking on a number of eastern accounts.

O. Metcalf, Jr., for many years representative of the eastern department of the Verona Tool Works, Pittsburgh, Pa., and since 1900 western sales manager of the same company, with headquarters at Chicago, has resigned, effective December 31. Mr. Metcalf will continue in the railway supply business as president of the American Railway Device Co. The company will have offices at 40 South Clinton street, Chicago.

In the collision at Jersey City, November 6, one of the steel passenger coaches jumped the track and turned over on its side, denting in the steel plates about 18 in., but the nine tungsten lamps, made by the General Electric Co., Schenectady, N. Y., in the car were found after the wreck to be in perfect condition, showing the remarkable strength and durability of the tungsten filament, when specially adapted for train lighting.

Charles Kirchhoff, editor of the *Iron Age*, has resigned, after service on that valuable publication for many years. He will go to Germany next spring to attend the International Congress of Mines and Metallurgy, and expects to continue his studies and writings in his chosen field. He has had a rare experience, one of the few editors of technical publications who has made it the business of his life to know all the highly important men among the readers of his paper. In the iron trade his name has been known and his expressions respected by all whose good opinion is worth having.

The Whipple Car Company, Fifty-first street and St. Louis avenue, Chicago, is now doing a large amount of repair work in addition to considerable new work in the way of refrigerator cars and structural steel underframes. It is working on an order for 500 Baltimore & Ohio refrigerator cars and is still employed in repairing Santa Fe cars. It has built a number of complete steel underframes for the reinforcement

of Santa Fe cars under the Posson patents. It is also building steel underframes for passenger cars to be supplied to the Hicks Locomotive & Car Works, Chicago, which company completes the upper frames. The Whipple company has also built a number of steel underframes for tank cars.

William Metcalf, president of the Braeburn Steel Co., Pittsburgh, Pa., died at his home on December 5. He was born in Pittsburgh in 1838 and, after graduating from the Rensselaer Polytechnic Institute in 1858, went back to Pennsylvania to work in the steel industry. He soon went into business for himself, and when his firm was combined with the Braeburn Steel Co., he was made president. Mr. Metcalf was an ex-president of the American Society of Civil Engineers, ex-president of the American Institute of Mining Engineers, and a member of the American Society of Mechanical Engineers, the British Institute of Civil Engineers, and the Engineers' Society of Western Pennsylvania. He was the author of several books on steel manufacture and other subjects.

The Ohio Steam Shovel Co., formerly of Toledo, Ohio, has been bought by Cincinnati capitalists, and the entire plant, including all patterns, drawings, material, etc., has been removed to Cincinnati, Ohio. All inquiries, orders for repair parts, etc., for Ohio steam shovels should hereafter be addressed to the Ohio Steam Shovel & Dredge Co., Cincinnati, Ohio. The company is prepared to make immediate delivery of its 30-ton steam shovel, mounted on either traction wheels or standard gage railway trucks, also its 45-50-ton boom pattern, 3-engine, 54-in. horizontal boiler Ohio shovel, and can deliver its 70-ton boom machine in 30 days. It also makes a specialty of dipper dredges. The business is being handled by F. A. Peckham and H. L. Hoeffer, both of Cincinnati; and P. B. Warner, Pennsylvania building, Philadelphia, Pa. Earle J. Banta, M. E., who has been mechanical engineer on the Panama Canal for several years, is chief engineer of this company and is in full charge of the designing and shop production department.

Paul M. Chamberlain has opened an engineering office at 1522 Marquette building, Chicago. Mr. Chamberlain was graduated from the Michigan Agricultural College in 1888, and from Cornell University in 1890. For several years he worked with the Brown Hoist Company, Cleveland, Ohio; the Frick Company, engineers, Waynesboro, Pa.; and the Hercules Iron Works, Aurora, Ill. He then became assistant professor of mechanical engineering at the Michigan Agricultural College. At the opening of the Lewis Institute in Chicago he took charge of the engineering work. During his connection with the Lewis Institute he carried on consulting work, with special reference to power production and factory methods. He resigned this position to act as chief engineer for the McCan Mechanical Works, Los Angeles, Cal. Later he became chief engineer of the Under-Feed Stoker Co. of America, where for the past two years and a half he has made a special study of boiler-room equipment, economy in fuel burning and smoke abatement. He will devote his time to new designs and improvement of existing installations.

TRADE PUBLICATIONS.

Draft Gear.—A folder issued by the T. H. Symington Co., Baltimore, Md., announcing the company's purchase of the Farlow draft gear, shows a view of a 7,562-ton train on the Virginian Railway, all of whose cars are equipped with Farlow attachments.

Air Compressors.—A folder published by the Chicago Pneumatic Tool Co., Chicago, describes the type G. H. Franklin high-speed air compressor. This is built for belt, rope, chain or gear drive, as well as for operation by steam or as an isolated unit with a gasoline engine. The latter combination was described in the *Railroad Age Gazette* of November 26, page 1044.

Meters and Lamps.—Bulletin No. 4,708 of the General Electric Co., Schenectady, N. Y., describes the Thompson direct-current test meter, type C B-3. The meter is furnished with two distinct ampere ratings, each with single 110-volt or double 100-220-volt potential windings. A folder issued by the company describes the intensified arc lamp, which is supplied for 110 to 125-volt direct or alternating-current circuit.

Buckets.—Catalogue No. 096 of the C. W. Hunt Co., New York, takes up coal tubs and grab buckets. These include side catch steel tubs, back lever steel tubs, contractors' tubs, bottom dumping tubs, Duplex grab buckets and King grab buckets. These are all illustrated, with descriptions, and illustrations are also given of special tubs and miscellaneous elevating machinery and other products of the company.

RAILROAD STRUCTURES.

ALLOUEZ, WIS.—The Great Northern has let the contract for rebuilding the upper portion of dock No. 2 to Schmitt Bros. & Hill, Superior, Wis. The cost of the work is estimated at \$300,000.

BOSTON, MASS.—The Boston Elevated has filed a petition with the railway commissioners for approval of the new East Cambridge extension, and has submitted plans for the proposed tracks and stations, including a new station on Causeway street, to have two platforms directly opposite the north station.

CHATTANOOGA, TENN.—The new station to be used jointly by the Southern, the Queen & Crescent and the Central of Georgia was opened for business on December 1.

CHICKASHA, OKLA.—See Oklahoma Central under Railroad Construction.

CLEVELAND, OHIO.—An officer of the Pennsylvania Railroad writes regarding the reports that a large amount of money is to be spent for improvements at Cleveland, including concrete and steel docks, that the company has contemplated improvements at this point, but for the present no work has been authorized.

DALLAS, TEX.—The State Railroad Commission issued an order directing the railways entering Dallas to provide a union station. No cost was specified for the building but the date for submitting plans was fixed as April 1, 1910, and for the completion of the building as March 1, 1911. After issuing the order the commission temporarily withdrew it, but according to the local press the withdrawal was for the purpose of changing the conditions of the order so that it could be more easily upheld in court, and it is not thought that the commission will change its decision as to the need of such a station in Dallas. (Nov. 5, p. 897.)

DENISON, TEX.—The Missouri, Oklahoma & Gulf is said to have given a contract to put up a five-span steel bridge over the Red river at Denison, the work to be finished by June, 1910.

EDMONTON, ALB.—A by-law has been passed permitting the entrance of the Canadian Pacific into Edmonton, Alb., providing overhead bridges on subways constructed along the route at various streets.

GUELPH, ONT.—It is understood that the Canadian Pacific has submitted a proposition to the city officials looking to the elimination of grade crossings in the city. This is to be accomplished by the construction of overhead bridges.

SOUTH BEND, IND.—The Grand Trunk advises that it is at the present building a four-span, double-track, plate girder bridge over the St. Joseph River. Each span is 124 ft. long and the structure rests on new masonry piers. The contract for the substructure was let to R. H. Evans & Co., Zanesville, Ohio, and for the superstructure to the Wisconsin Bridge & Iron Co., Milwaukee, Wis.

TERRE HAUTE, IND.—An officer of the Pennsylvania Railroad writes regarding the reports that shops are to be put up at Terre Haute that there is no truth in the report. The company is contemplating some minor improvements. (Nov. 12, p. 927.)

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Illinois Traction System has ordered two electric locomotives from the Baldwin Locomotive Works.

The Grand Rapids & Indiana has ordered four consolidation locomotives from the American Locomotive Co.

The Elgin, Joliet & Eastern is in the market for 5 eight-wheel switch, 12 six-wheel switch and 6 consolidation switch locomotives. The order will probably be placed before the end of the year.

The Idaho & Washington Northern has ordered two simple consolidation locomotives from the Baldwin Locomotive Works, as mentioned in the *Railroad Age Gazette* of November 12. Delivery is specified for February, 1910.

<i>General Dimensions.</i>	
Weight on drivers	180,000 lbs.
Total weight	198,000 "
Cylinders	22 in. x 28 in.
Diameter of drivers	.55 "
Type of boiler	Straight top
Working steam pressure	.200 lbs.
Heating surface, tubes	3,117 sq. ft.
" " firebox	172 "
" " total	3,289 "
Tubes, number	406
" outside diameter	2 in.
" length	14 ft. 9 "
Firebox, type	Wide
" length	114 in.
" width	72 "
Grate area	.57 sq. ft.
Tank capacity	9,000 gals.
Coal capacity	.15 tons

<i>Special Equipment.</i>	
Bell ringer	Northern Pacific
Brakes	Westinghouse
Brake-beams	Vanderbilt
Couplers	Tower
Headlight	Pyle National
Injector	Hancock
Piston and valve-rod packings	U. S. Metallic
Safety valve	Consolidated
Sanding device	Leach
Sight-feed lubricators	Chicago
Springs	Standard Steel Works
Tires	Standard Steel Works
Valve gear	Walschaerts

The Atlanta, Birmingham & Atlantic, as mentioned in the *Railroad Age Gazette* of October 29, has ordered six simple eight-wheel locomotives from the Baldwin Locomotive Works, for January 15 delivery.

<i>General Dimensions.</i>	
Type of locomotive	4-4-0
Weight on drivers	.97,000 lbs.
Total weight	143,000 "
Cylinders	19 in. x 26 in.
Diameter of drivers	.67 in.
Type of boiler	Extended wagon top
Working steam pressure	.200 lbs.
Heating surface, tubes	2,035 sq. ft.
" " firebox	180 "
" " total	2,215 "
Tubes, number	324
" outside diameter	2 in.
" length	12 ft.
Firebox, type	Narrow
" length	114 in.
" width	42 "
" maker	Otis
Grate area	.34 sq. ft.
Tank capacity	6,000 gals.
Coal capacity	.11 tons

<i>Special Equipment.</i>	
Axles	Iron
Bell ringer	Trojan
Boiler lagging	Johns-Manville sectional
Brakes	Westinghouse
Brake-beams	Diamond special
Brake-shoes	Lappan
Couplers	Sharon
Driving boxes	Steel
Headlight	Pyle National
Injector	Simplex, Nathan
Journal bearings	Ajax
Piston and valve rod packings	Trojan
Safety valve	Ashton
Sanding devices	Company's
Sight-feed lubricators	Nathan Bull's-eye
Springs	Baldwin
Staying	Radlai
Steam gages	American Steam Gage & Valve Co.
Steam heat equipment	Gold
Tires	Latrobe
Tubes	Spellerized, National Tube Co.
Valve gear	Four Walschaerts and two Pillard
Wheel centers	.60 in.

The Chicago & Alton has sent 15 locomotives to the Hicks Locomotive & Car Works and 10 to the American Locomotive Company's plant at Pittsburgh, Pa., to be overhauled.

The Boston & Maine has ordered from the American Locomotive Co. 50 simple locomotives, as follows: Ten six-wheel switch, 20 consolidation, 10 mogul, and 10 Pacific locomotives. The general dimensions for the four types are as follows:

Type of locomotive.....	0-6-0	2-8-0
Weight on drivers.....	120,000 lbs.	152,000 lbs.
Total weight.....	120,000 "	175,000 "
Cylinders.....	19 in. x 24 in.	20 in. x 30 in.
Diameter of drivers.....	51 in.	61 in.
Type of boiler.....	Radial,straight top.	Radial,straight top.
Working steam pressure.....	160 lbs	200 lbs.
Heating surface, tubes.....	1,480.4 sq. ft.	2,716.87 sq. ft.
" " firebox.....	155.3 "	143 "
" " total	1,635.7 "	2,859.87 "
Tubes, number.....	259	326
" outside diameter.....	2 in.	2 in.
" length	11 ft.	16 ft.
Firebox, type.....	Bet. frames.	Wide,ovr whls.
" length	102 $\frac{1}{8}$ in.	102 $\frac{1}{8}$ in.
" width	32 $\frac{1}{8}$ "	65 $\frac{1}{4}$ "
" material & maker.....	WorthBros., stl.	Worth Bros.
Grate area.....	22.8 sq. ft.	46.5 sq. ft.
Tank capacity for water.....	4,000 gals.	5,000 gals.
Coal capacity.....	7 tons.	13 tons.

Type of locomotive.....	2-6-0	4-6-2
Weight on drivers.....	125,000 lbs.	139,000 lbs.
Total weight.....	145,000 "	215,000 "
Cylinders.....	19 in. x 26 in.	22 in. x 28 in.
Diameter of drivers.....	63 in.	73 in.
Type of boiler.....	Radial, wgn tp.	Radial,straight
Working steam pressure.....	200 lbs.	200 lbs.
Heating surface, tubes.....	1,733.8 sq. ft.	3,477 sq. ft.
" " firebox.....	159.39 "	189 "
" " total	1,893.2 "	3,666 "
Tubes, number.....	286	342
" outside diameter.....	2 in.	2 in.
" length	11 ft. 8 in.	19 ft. 6 in.
Firebox, type.....	Over frames.	Wide,ovr whls.
" length	108 $\frac{3}{8}$ in.	102 $\frac{1}{8}$ in.
" width	40 $\frac{1}{8}$ "	65 $\frac{1}{4}$ "
" material & maker.....	WorthBros.,stl.	WorthBros.,stl.
Grate area.....	30.2 sq. ft.	46.5 sq. ft.
Tank capacity for water.....	5,000 gals.	6,800 gals.
Coal capacity.....	10 tons.	12 tons.

Special Equipment.

Axes	Carnegie Steel
Boiler lagging	Ehret, 85 per cent. magnesia
Brakes	Westinghouse
Brake-beams	Buffalo (all but 4-6-2)
Brake-shoes	American Brake-Shoe & Fdry. Co.
Brick arch. None (0-6-0 and 2-8-0); Yes (2-6-0 and 4-6-2)	
Couplers	Tower
Draft gear	Westinghouse friction (all but 0-6-0)
Driving boxes	Gun iron (0-6-0 and 2-8-0)
Driving boxes	Steel castings (4-6-2 and 2-6-0)
Headlight	Commercial Acetylene Co.
Injector	Hancock
Journal bearings...Amer. Loco. Co. and Wm. A. Hardy	
Piston and valve-rod packings.Hayden Mfg. Co. Downing	
Safety valve	Ashton
Sanding devices	Hanlon
Sight-feed lubricators	Detroit No. 21
Spring	(2-8-0, 2-6-0 and 4-6-2)
Springs	Railway Steel Spring Co.
Staying	Bethlehem special iron
Steam gages	American
Steam-heat equipment	Consolidated (4-6-2)
Tires	Midvale
Trucks	Fox (all but 4-6-2)
Tubes	Worth Bros.
Valve gear	Stephenson (0-6-0 and 2-6-0), Walschaerts (2-8-0 and 4-6-2)
Wheel centers	Steel castings

CAR BUILDING.

The Pennsylvania has ordered during the current calendar year 26,000 freight cars, as previously noted from time to time. Of these, 10,000 were mentioned in the *Railroad Age Gazette* of November 19, and the remaining 16,000 were the following:

Regular replacement schedule, 1909.....	6,000
Additional replacement schedule, 1909.....	2,000
Regular replacement schedule, 1910	8,000
Total	16,000
For Lines	
Kind of car, Class.....	East West Total.
Gondola	Gla 3,614 50 3,664
" " Gra	1,000 715 1,715
" " Gr	32 32
" " Gsd .....	.... 50 50
Coke	H2l 1,001 4,200 5,201
Box	Xl 3,197 433 3,630
Box (automobile)	Xlc 600 250 850
Refrigerator	Rf 15 22 37
Flat	Fm 15 100 115
Cabin	Nd 67 108 175
Stock	Kt 531 531
Total	9,541 6,459 16,000

The Missouri, Kansas & Texas has ordered a private car from the St. Charles shops of the American Car & Foundry Co.

The Virginia Passenger & Power Co., Richmond, Va., will buy 20 pay-as-you-enter cars and also 40 sets of motor equipment for cars now in service.

The Illinois Traction Co. is understood to have ordered the 30 express trail cars mentioned in the *Railroad Age Gazette* of December 3. This is not yet confirmed.

The Boston & Maine is negotiating with the Laconia Car Co. for 500 to 1,000 cars, the board of directors having authorized the purchase of 2,000 steel underframe box cars.

The Staten Island Rapid Transit is asking bids on 10 open platform coaches, as mentioned in the *Railroad Age Gazette* of November 26. They will weigh 38,300 lbs. and will measure 45 ft. 1 in. long, 8 ft. 11 $\frac{1}{4}$ in. wide, and 8 ft. 3 in. high, inside, and 61 ft. 10 in. long, 10 ft. wide and 12 ft. 7 in. high, overall. Bodies and underframes will be of wood. The special equipment includes:

Axles	M. C. B.
Bolsters, body	Wood
Bolsters, truck	Wood reinforced
Brakes	Eames Vacuum
Brake-beams	Creco
Brake-shoes	M. C. B.
Brasses	M. C. B.
Couplers	Narrow-gage; Janney
Curtain fixtures	Ring, pinch handle
Curtain material	Printed duck
Doors	Single, sliding
Door fastenings	Adams & Westlake
Draft gear	McConway & Torley
Dust guards	M. C. B.
Heating system	Consolidated
Journal boxes	M. C. B., for 3 $\frac{3}{4}$ in x 7 in.
Lighting system	Oil
Paint	S. I. R. T. Ry. standard
Platforms	Wide
Roofs	Monitor
Seat covering	Rattan
Side bearings	Plain, cast iron
Springs	Elliptic, triple
Trucks	Four-wheel, M. C. B.
Ventilators	Manhattan, deck sash openers
Wheels	33-in. Page
Window fixtures	Adams & Westlake

MACHINERY AND TOOLS.

The Oregon Short Line has issued a list of machinery and tools amounting to about \$100,000.

The Pennsylvania Railroad, it is said, will soon be in the market for an extensive list of tools.

The Lackawanna Bridge Co. has ordered for its Buffalo plant 25 220-volt, d. c. motors. The order was placed with the Allis-Chalmers Co., Milwaukee, Wis.

IRON AND STEEL.

The Delaware & Eastern is in the market for 4,000 tons of bridge steel.

The Quebec Bridge, it is estimated, will require about 60,000 tons of steel.

The Hudson & Manhattan is in the market for 1,000 tons of steel for tunnel work.

The Pittsburgh, Shawmut & Northern is in the market for 6,000 tons of bridge steel.

The Pittsburgh & Lake Erie has ordered 14,500 tons of rails from the Carnegie Steel Co.

The Central of Georgia is said to have ordered 840 tons of rails from the Tennessee Coal, Iron & R. R. Co.

The Brooklyn Rapid Transit Co. has received bids on elevated structure and station improvements requiring about 500 tons of steel.

The San Diego & Arizona, which is now building south from San Diego, Cal., has ordered from the Colorado Fuel & Iron Co. 6,000 tons of 90-lb. rails for use on the line east of Tia Juana, Mex.

General Conditions in Steel.—There is an active demand for forgings and frogs and switches. New business in finished steel is lighter than a month or six weeks ago. The demand for pig iron has slackened, but there is a shortage of steel billets. The November net earnings of the United States Steel

Corporation are estimated at \$14,000,000, which is greater than any November earnings in the history of the company.

SIGNALING.

The Chicago, Burlington & Quincy has ordered material for, or has just completed, the following mechanical interlocking plants.

At Hoffman avenue, St. Paul, "Style A" machine, 48-lever frame, 45 working levers, power-operated distant signals.

At Division street, St. Paul, "Style A" machine, 52-lever frame.

At Oakland, Minn., Saxby & Farmer machine, 36-lever frame, 28 working levers, power-operated distant signals.

At Aurora, Ill., rebuilding interlocking, Saxby & Farmer machine, 48-lever frame, 43 working levers, power-operated distant signals.

At Seward, Neb., joint with Chicago & Northwestern, Saxby & Farmer machine, 40-lever frame, 36 working levers, time locks for through routes, power-operated distant signals.

At Crawford, Neb., joint with Northwestern, Saxby & Farmer machine, 44-lever frame, 39 working levers. Time locks for through routes, power-operated distant signals.

At Harvard, Neb., joint with Northwestern, Saxby & Farmer machine, 16-lever frame, 14 working levers, time locks used for through routes, power-operated distant signals on the Burlington.

At Exeter, Neb., a plant like the one at Harvard in all respects, joint with Northwestern.

At York, Neb., a plant like the one at Harvard in all respects, joint with Northwestern.

At Superior, Neb., a plant like the one at Harvard in all respects, joint with the Northwestern.

At Northport, Neb., joint with Union Pacific, Saxby & Farmer machine, 16-lever frame, 14 working levers, power-operated distant signals, detector circuits on the Union Pacific.

At Hill street, Lincoln, Neb., joint with Union Pacific, Saxby & Farmer machine, 20-lever frame, all spaces used, power-operated distant signals.

The Burlington provides a separate lever for each facing point lock and this has been done at all these plants.

At Seward, Crawford, Harvard, Hill street, Lincoln, Exeter, York, Superior and Northport, there will be brick towers without leadout platforms, the leadout apparatus being supported on concrete foundations. Deflecting bars are used for leadout. Pipe carrier tops are of cast iron. No wood is used in any of these plants except beams and flooring in the towers.

The Oregon Short Line has under construction or has ordered material for about 266 miles of single track, lower quadrant, two-position, normal clear automatic block signals between the following points: Pocatello and Ticeska, Reverse and Nampa, Salt Lake and Sandy, at Ogden and Cache Junction. This order includes also about 22 miles on the Southern Pacific east of Sparks, namely, Deeth to Wells, 20 miles, and through Winnemucca yards.

The installation of automatic block signals has just been completed through Glenn's Ferry yards and Imlay yards. Work is in progress on changing from single to double track from Woods Cross to Farmington, and Pocatello to Inkom. There will be an eight-lever Saxby & Farmer mechanical interlocking machine at the end of double track at Farmington. All high signals will be power-operated, "Style B," made by the Union Switch & Signal Company. The same type of signal is being used in all the automatic work mentioned.

The O. S. L. has also under consideration an electric interlocking plant at Ninth street, Salt Lake City. This will displace a 32-lever Saxby & Farmer mechanical plant at present in use and is made necessary by the construction of a joint station by the San Pedro, Los Angeles and Salt Lake and the Denver & Rio Grande at this point. This involves the construction of a new double track making several crossings with existing tracks. There are to be 92 operated units, necessitating probably a 125-lever machine. The plant will include a junction of the San Pedro, single track, with the Short Line double track; two grade crossings, both double track of the San Pedro and the Rio Grande, end of double track of the Short Line and several yard switches.

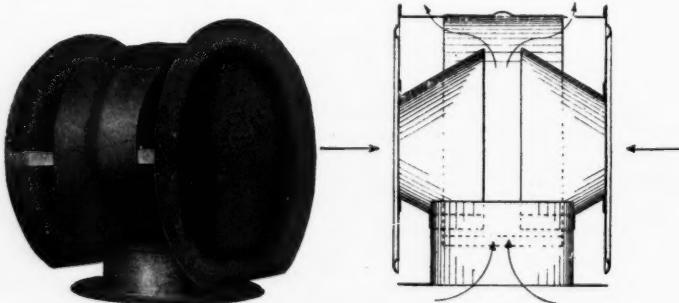
Recent Machine Tools.

Gold's Cyclone Ventilator.

The Gold Car Heating & Lighting Co., New York, has brought out a new ventilator for passenger cars. The Cyclone ventilator's capacity for educting air is claimed to be much greater than any of the others which are on the market. The general appearance of the ventilator is illustrated by the photograph, the opening into the car being 5 in. in diameter, the outside diameter of the ventilator 10 $\frac{1}{4}$ in., while the thickness is about 7 $\frac{1}{2}$ in. It is made of heavy galvanized iron, thoroughly riveted together so as to stand comparatively rough usage.

To determine the efficiency of this ventilator, tests were made similar to those conducted by the Master Car Builders' committee in 1894. The effect of a moving train was produced by testing the ventilator in front of a Sirocco blower (American Blower Co., Detroit, Mich.), with 16-in. outlet, the blower being driven by a motor, so that various speeds could be obtained up to 50 miles an hour. In order to make the tests comparative with those of the M. C. B. committee, above referred to, the ventilator was tested 3 ft. 2 in. from the nozzle of the blower, the velocities of the air being determined by a Taglibue draft gage, as the higher velocities were too severe for the anemometer, which could be used at lower speeds.

In the accompanying diagram, line A shows the velocity of eduction for the various blasts, regulated to correspond with different train speeds in miles per hour. In making these tests the ventilator was secured to the side of a



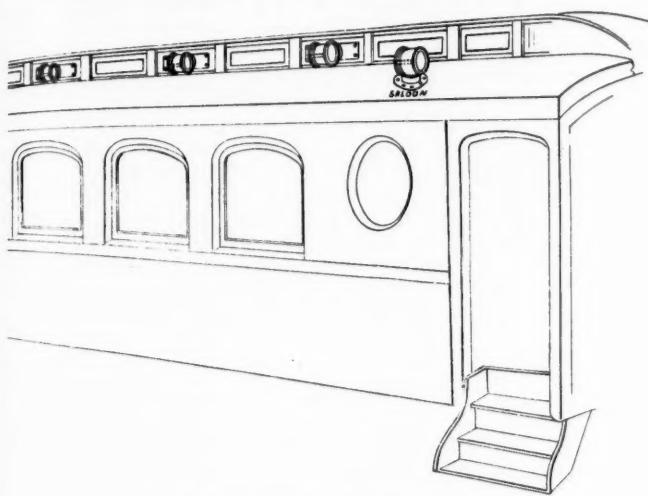
Cyclone Ventilator.

box in a similar manner to its location on the side deck of a passenger car, as shown in the sketch representing the method of placing these ventilators on railway cars. An anemometer was placed immediately inside of the opening and the velocity of eduction was measured by this anemometer. The dots along the line A show the actual results of the various tests, and the line drawn gives about a mean position for this group of points. In a general way, it shows that at a speed of 49 miles per hour the velocity of eduction was 1,530 ft., and at 30 miles per hour the air was pulled out of the box through the ventilator at a speed of 930 ft. a minute. As line A is straight, the velocity of suction, by means of ventilator, is evidently directly proportional to the velocities of the train.

In order to obtain some comparison between the Cyclone and those that were tested in 1894, by the M. C. B. committee, one of the type of ventilators giving the best results in that test was submitted to the same treatment as the Cyclone ventilator. The results are shown by the line B, the open circles giving the points taken from the actual tests. From these two diagrams it is evident that the velocity of eduction through the ventilator with which comparison was made was not quite two-thirds that of the Cyclone ventilator, and while the Cyclone ventilator was 5 in. in diameter at the neck connecting to the deck of the car, the ventilator against which it was tested was only 4 in. in diameter, and in determining the volume of eduction it was considered that if a 5-in. size had been available, the velocities would have been the same and the quantity of air removed would be in direct proportion to the areas of the necks of the two ventilators.

At the right hand side of the diagram are several lines show-

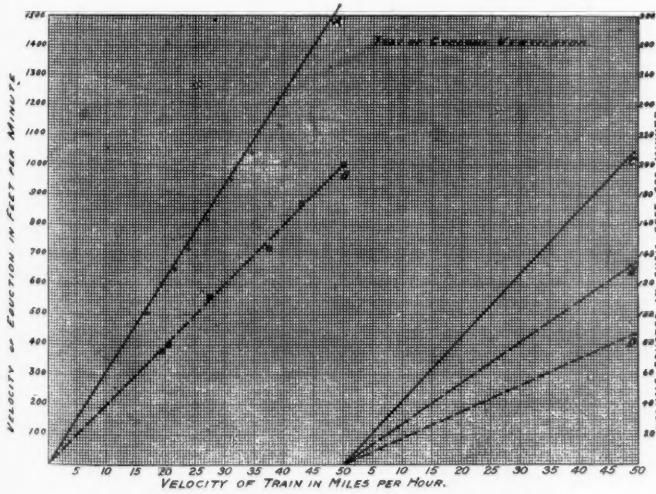
ing the volume in cubic feet per minute of air educted, the line C corresponding to the 5-in. Cyclone ventilator under test, from which it is evident that at 49½ miles per hour (which was the speed at which the M. C. B. committee tests were made) there were 210 cu. ft. of air educted from the interior of the box or car per minute. With the 4-in. ventilator, with which this was compared, there were 87 cu. ft. per minute educted at 49½ miles per hour, as shown by the line D. If, however, this value is increased by the ratio of a 5-in. circle to a 4-in. circle, the volume of eduction would be 137 cu. ft.



Application of Ventilators to Car.

per minute at 49½ miles per hour, as shown by the line E. It is evident, therefore, that the Cyclone ventilator has a capacity fully 50 per cent. in excess of the ventilator against which it was tested. The M. C. B. tests gave 90 cu. ft. per minute as the greatest volume of air removed from the interior of a car at 49½ miles per hour.

In connection with the heating and ventilation of passenger cars it was determined by one of the largest railways in the country that an allowance of 1,000 cu. ft. of air per passenger per hour would be sufficient for satisfactory ventilation, and the removal of carbonic acid and other noxious gases. In an express train averaging 40 miles an hour speed the capacity of the Cyclone ventilator is 170 cu. ft. per minute, or 10,200 cu. ft. per hour. In the case of a local and suburban train,



Tests of Cyclone Ventilator.

while the average speed is much less, the frequent opening of doors for the admission and distribution of passengers admits a large amount of air, and generally much more than needed for actual ventilation. On express trains the doors are open less frequently, and entire dependence must be placed upon the ventilators. Thus it is evident that one ventilator would be sufficient for ten passengers under the assumptions above made, or that a car seating eighty passengers would require

only eight ventilators to keep the atmosphere in the cars in a comfortable and healthful condition.

The sketch shows that it is possible to place many more ventilators in the deck of a passenger car than would be absolutely necessary, and it also shows that these ventilators can be placed on a horizontal roof surface, as, for instance, the ceiling of the saloon, as well as on the vertical surface of the sides of the deck. In either case the efficiency of the ventilator, as an exhauster of air within the car, will be dependent on the speed of the train.

This ventilator is also adaptable to refrigerator cars, and when so used gives the perfect ventilation necessary for the preservation of fruits and vegetables.

Steel Sheet Piling for Bridge Pier.

There is now under construction across the St. Louis river near New Duluth, Minn., a steel viaduct and draw-bridge. The new line runs from Adolph, Minn., on the Duluth, Missabe & Northern, a short distance north of Duluth, around to the St. Louis river, crossing it near New Duluth, and thence across Wisconsin to Allouez bay on the shore of Lake Su-



Steel Sheet Piling for Bridge Pier Construction.

perior, crossing and connecting with every railway which runs into both Duluth and Superior except the Duluth & Iron Range.

The plans contemplate a double-deck steel structure with a total length of 1889 ft. between abutments. This will carry the two tracks of the Interstate Transfer Railway on the upper deck, with sidewalks for pedestrians, and two street car tracks with roadways on the lower deck. The base of rail of the tracks on the upper deck is approximately 53 ft. above low water in the river, and the ground on the west side of the river is only about 1 ft. above low water, being a marsh almost level with the surface of the river at ordinary stages of water. The main span, the center of which is 340 ft. from the east abutment, is a pivoted draw-bridge 300 ft. long, of the parallel chord Warren truss type with intermediate bottom chord suspenders, the upper and lower tracks being in close relation to the top and bottom chords. The weight of steel in the draw-span will be about 1072 tons. The approaches consist of fourteen 70-ft. plate girder spans alternating with 30-ft. p'ate girder spans forming towers, there being, altogether, 13 of the latter. The end spans at both abutments are 30-ft. plate girders.

The piers will be of concrete, supported on piles. In the construction of the easterly pier of the draw-span, now complete, United States steel sheet piling, made by the Carnegie Steel Co., Pittsburgh, Pa., was used in units 12 in. wide, weighing 40 lbs. to the square foot and in 40-ft lengths, about 110 tons being required. A single wall of piling was driven, reliance being placed upon the water-tight qualities of the interlock instead of using the customary bank of puddle, or berm, around the exterior of the cofferdam, the current of the river being so great that it was doubtful whether any ma-

terial could have been retained for this purpose without using an external wall of sheeting.

Preliminary work on the pier was done during the winter of 1908, the river being then 26 ft. 3 in. deep at the site of the foundation, which is in the edge of the main channel. For driving the steel piling a cast iron driving hood was procured to fit the leads of the pile driver, shaped to fit the piling on the underside, and having a recess on top for a wooden striking block or cushion. Strips of fir 36 ft. long, sawed $1\frac{1}{2}$ in. x $1\frac{1}{8}$ in., were provided for driving with the steel piling in the interlocking groove so as to form an absolutely watertight joint after some hours immersion in the water had caused the wood to swell, but these strips were found to be somewhat too large, $1\frac{1}{2}$ in. x $\frac{7}{8}$ in. being preferable. The dimensions of the pier are $19\frac{1}{2}$ ft. wide x 44 ft. long to the beginning of nose, the nose itself being $9\frac{1}{2}$ ft. long; the piling was started at the nose, and the closure was made on the point of the latter with a right-angle piece. The driving had been so done that this last piece entered and was driven with perfect ease. Previous to the driving of the sheet piling the bearing piles for the foundation had been driven inside the area enclosed by the cofferdam and it was attempted to put in the top set of braces, lower the water by pumping for the next set of braces and so work down to the bottom. This plan failed, as a 10-in. centrifugal pump was unable to lower the water sufficiently fast, and diver was required to cut off the bearing piles at the ground level. After this, the various sets of bracing were built up in order from the bottom up, being framed at the river surface and sunk in succession by the weight of those above. At this time the cofferdam was still leaking very badly and two sleigh-loads of horse manure were therefore dumped into the river outside the dam. Within an hour after this was placed, the water inside the cofferdam was 12 ft. down from the surface of the river and the pump was shut down for the dinner hour. On resuming work after dinner, it was found that the water had raised about 2 in. It was completely pumped out in the afternoon and from that time on it was only necessary to run the pump for a few moments at a time, the centrifugal pump being discarded and a 4-in Emerson vacuum pump being substituted. After the footing of the pier was in place and the forms set up, it was found desirable to use the pump only about once a day. On reaching the bottom of the cofferdam, it was found that a great deal of the water which had caused trouble had been coming in underneath the sheet piling, through a pocket of gravel at the nose of the pier; the balance of the area exposed consisted of red clay with a little quicksand in one corner, but this gave no trouble as the manure appeared to have been drawn in sufficiently to stop the leak. The steel walls were almost perfectly dry.

It is expected that the same sheet piling will be pulled and used again for the west pier of the draw-span; also for the central pivot pier and for 60 small piers, constituting the foundations of the 30-ft. towers crossing this swamp. Neither the chief engineer nor any of the men employed had ever had any previous experience with steel sheet piling. The entire design and direction of the work is under the direct supervision of H. L. Drsser, chief engineer.

Vanadium Steel.

A recent paper before the British Iron & Steel Institute contains the results of tests made by the Alloys Research Committee and gives some interesting facts showing the advantage of small per cents. of chromium and vanadium in steel for the parts of engines and other machinery subjected to high tension. A sample steel of this kind contains .032 per cent. carbon, 1.10 per cent. chromium and 0.16 per cent. vanadium. This when quenched in oil from 900 degrees C. and tempered at 545 C. gives a steel having a high elastic limit and maximum strength, these values being equal to steel containing 5 per cent. nickel and 1 per cent. chromium. A most noteworthy feature of chromium vanadium steel is its endurance under repeated stresses. This steel tempered in oil gives an elastic limit of 109,000 lbs. and maximum stress of 125,800 lbs. with an elongation of 2 in. of 21 per cent. The general tests of alloy steels, such as nickel chromium and chromium vanadium, show the latter to be the best high

tension steel, and the results amply confirm previous work and go to show that a remarkable range of properties may be obtained by suitable manipulation in heat treatment of steels containing moderate proportions of chromium and vanadium.

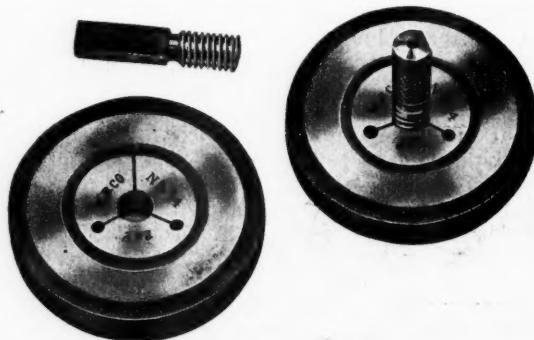
The American Vanadium Co., Pittsburgh, Pa., furnish details of recently completed tests of some vanadium steel eye bars for bridge construction which show the following results: Ultimate strength, 111,780 lbs.; elastic limit, 96,735 lbs.; elongation, 7.7 in. in 20 ft.; reduction of area, 42.5 per cent.

Vanadium is finding increased application in cast iron. A report from one of the largest foundries in the East shows nine perfect vanadium castings out of ten after machining, while the former practice on straight iron gave a loss in the machine shop of 65 per cent. Without mentioning the increase of 15 per cent. in tensile strength and 21 per cent. in elastic limit, this elimination of defective pieces pays for the cost of the added vanadium many times over. Some time ago it was customary to use as high as .25 per cent. contained vanadium, but present practice has reduced this to something between .10 and .15 per cent. Within this range the best results are obtained, and the cost of the vanadium alloy is almost negligible. This refers only to the use of vanadium in cast iron and cast steel. In high speed steels and forgings, of course, the vanadium content ranges between .16 and .25 per cent.

Little Giant Limit Gages.

The American Society of Mechanical Engineers recently adopted a schedule of standard limits for machine screw sizes, which has been approved and recommended by the manufacturers of taps and dies. By standard limits is meant the range of variation allowed to any thread size.

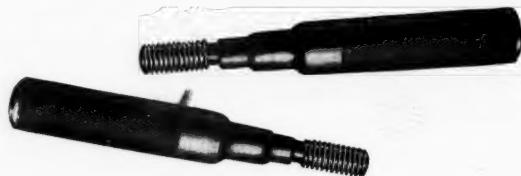
For measuring machine screws in large quantities to accord with these standards, the Wells Brothers Co., Greenfield, Mass.,



Template Gages.

is making a new style of measuring instrument, the Little Giant Limit Gage, in plug and template form.

These gages have this distinctive feature: They are made in pairs, and each gage is fitted with a hard fiber ring or handle; on one gage of each pair the fiber is black, and on the other, red. The templates shown herewith have fiber rings and are furnished for sizes No. 9 to No. 14 inclusive; others have handles covered with fiber, and are furnished for sizes



Plug Limit Gages.

No. 16 to No. 30 inclusive.. The plug gages shown herewith are furnished as illustrated for all sizes.

The black gage is correct in size, but the red one is not; it is set a certain limit under size in the template form, and over size in the plug form. A screw that will enter the red template gage is too small; a nut or other tapped hole that will allow the red plug gage to enter is too large. This feature leaves no excuse for the mistake of using the wrong gage. The red gage in every case denotes danger.